Minerals and Energy Branch
Open File Report ME 2000-3

Limestones and Dolomites of Nova Scotia
Part 3
Colchester and Halifax Counties

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(with summary of General Geology by R. C. Boehner)

NOVA SCOTIA
Natural Resources

Minerals and Energy Branch

Halifax, Nova Scotia
2000

For Part 1 (Cape Breton Island), see Bulletin ME 2, Part 1.

For Part 2 (Antigonish, Guysborough Pictou and Cumberland counties), see Bulletin ME 2, Part 2.

Disclaimer

The field work, drilling and analyses for this report were carried out in the late 1960s. Users are cautioned that conditions and landownership reflect those at the time of original fieldwork. A minimal amount of information has been added from work carried out for Canada Cement Lafarge Limited in the 1980s and staff geologists. British units have been converted to metric units.

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CHAPTER 1. INTRODUCTION

INTRODUCTORY STATEMENT

This report is intended to direct attention to areas in Colchester and Halifax Counties where commercial grades of limestone and dolomite occur and to indicate briefly the potential that still exists for outlining additional economic deposits. Diamond drilling will be necessary in most locations for further investigation.

This coverage of Colchester and Halifax Counties involves both a surface examination of known and previously unknown limestone and dolomite occurrences and preliminary diamond drilling programs (Fig. 1-1). This work constitutes part of a full inventory of occurrences in areas underlain by limestones and dolomites throughout Nova Scotia.

The limestones described in this report follow the format proposed by Bell (1929). He introduced five main subzones, A, B, C, D and E, with A Subzone being the base of the Windsor Group of rocks and the E Subzone being the youngest limestone bed in the succession. Stacy (1953) later modified Bell's (1929) work and divided the subzones even further, i.e., A_1, A_2, B_1, B_2, B_3, etc. These were divided on the basis of fossil content or on some particular characteristic restricted to a specific limestone bed.

Some of these later divisions by Stacy (1953) cannot be considered strict time boundaries, but are probably due to a change in environmental conditions within an area. These divisions, however, are useful for describing different limestone beds in this report.

PURPOSE OF SURVEY

The primary purpose of this inventory of limestones and dolomites is to produce an assessment of Colchester and Halifax Counties comparable to those which have been completed for Cape Breton Island (Shea and Murray, 1969) and for Antigonish, Guysborough, Pictou and Cumberland Counties (Murray, 1975). Pertinent data covering location, extent, structure and characteristics are recorded herein. To these data have been added results of the analyses of all samples taken.

A preliminary drilling program to supplement the surface inventory was carried out in selected areas, guided primarily by economic considerations (Chapter 4 and Appendix 1).

SAMPLING PROCEDURE

Analyses of 122 surface samples (58 from Colchester County, 64 from Halifax County) taken from limestone and dolomite occurrences constitute part of this report and are included in the section dealing with individual outcrops and occurrences.

Samples which show an analysis for silica in excess of 20% are omitted from this report. Deletion of this will cause a break in the sampling sequence in some areas.

All samples collected and analyzed are coded, first by letter indicating the area from which the sample was taken, followed by two numbers. The first number denotes the outcrop, and the

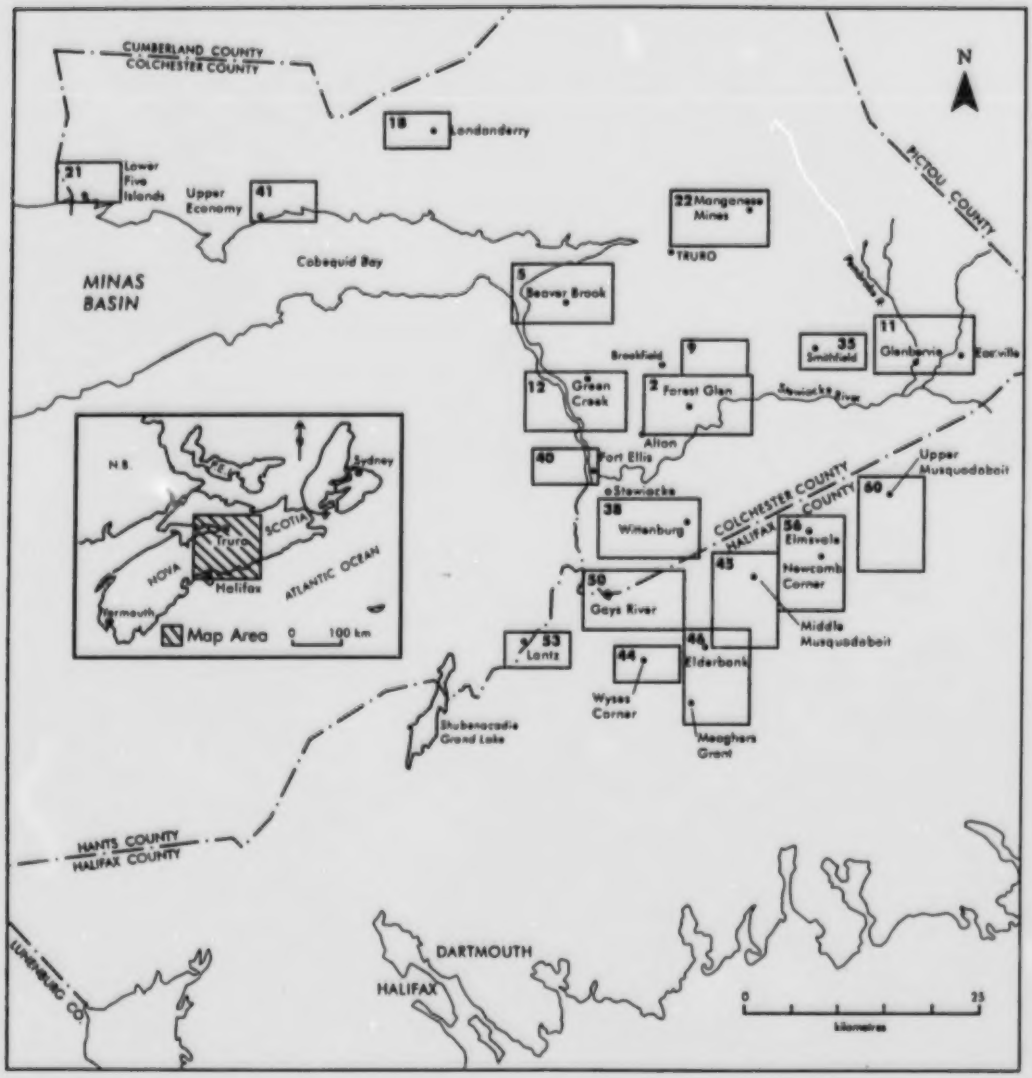


Figure 1-1. Locations and numbers of figures for limestone and dolomite occurrences in Colchester and Halifax Counties.

second number denotes the sample. As an example, consider sample MM-1-1. The code indicates that this sample was taken in the Manganese Mines area of Colchester County, on the first outcrop examined and sampled. All locations of samples taken are recorded by longitude and latitude in Appendix 2 with reference to the National Topographic System for Nova Scotia, scale 1:50 000.

The distances and thicknesses given in the descriptions have been converted from British units to metric units.

SCOPE OF INVESTIGATION

The investigation of limestone and dolomite occurrences in Colchester and Halifax Counties began during the latter part of 1967 and continued through 1968. Field work was directed primarily towards surface inventory of known and previously unknown occurrences. Samples taken from these occurrences and outcrops were analyzed, each showing described and the geology studied. Where good quality stone was found with tonnages of possible significance, a preliminary drilling program consisting of two or more holes was undertaken. All limestone and dolomite cores from the drilling were analyzed.

Preliminary data and regional geological references were obtained from the old and new series geological maps and reports published by the Geological Survey of Canada.

GENERAL GEOLOGY

(R. C. Boehner)

The Colchester and Halifax Counties area, described in this report, is located in the eastern and northern part of the Minas Sub-basin of Bell (1958) which includes the area underlain by Carboniferous age rocks in Hants, Halifax and Colchester Counties. The area is included on parts of the following National Topographic System (NTS) maps sheets: 11D/14, 11E/02, 11E/03, 11E/05, 11E/06, 11E/07 and 21H/08. The area is accessible from the Trans-Canada Highway 104 connecting Truro and Amherst, and the Trans-Canada Highway 102 connecting Halifax and Truro. There is a good system of paved and unpaved roads which provides easy access to most of the area.

The majority of the limestone and dolomite occurrences and deposits in Colchester and Halifax Counties occur in the Windsor Group making it the most important Carboniferous age rock unit for limestone and dolomite resources in the region. The location maps and descriptions of these localities are very useful in relocating the stratigraphically important carbonate outcrops. More recently, the stratigraphy and general geology of the major carbonate buildups in the area were described by Boehner (1988) and Boehner *et al.* (1987). The larger A Subzone carbonate buildups and small B Subzone carbonate buildups, as well as other limestone members in the Colchester and Halifax Counties area, were used locally as a source of limestone for agricultural needs.

Most of the carbonate rocks of the central Nova Scotia region occur within parts of two Carboniferous structural basins referred to as the Musquodoboit Basin and the Shubenacadie Basin (Figs. 1-2, 1-3). The Musquodoboit and Shubenacadie Basins are northeasterly elongated synclinal structural basins in central mainland Nova Scotia (Giles and Boehner, 1982a) and contain up to 1500 m (stratigraphic thickness) of upper Paleozoic continental and marine sedimentary rocks. The strata range in age from Late Devonian-Early Carboniferous (Tournaisian) to Late Carboniferous (Westphalian B-C). They overly, with angular unconformity, Cambrian to Ordovician age meta-sedimentary rocks of the Meguma Group that were intruded by Late Devonian age peraluminous granitoid rocks. Contacts with the bounding basement blocks are complicated by syn- and post-Carboniferous fault movements. The earliest basin fill (up to 500 m) is dominated by coarse- to fine-grained alluvial, fluvial and lacustrine strata of Late Devonian-Tournaisian to early Viséan age comprising the Coldstream, Horton Bluff and Cheverie Formations of the Horton Group. The Horton Group onlaps the basement along parts of the southern and western borders with the Meguma Group metasedimentary rocks and Musquodoboit Batholith granitoid rocks. The Windsor Group (Viséan)

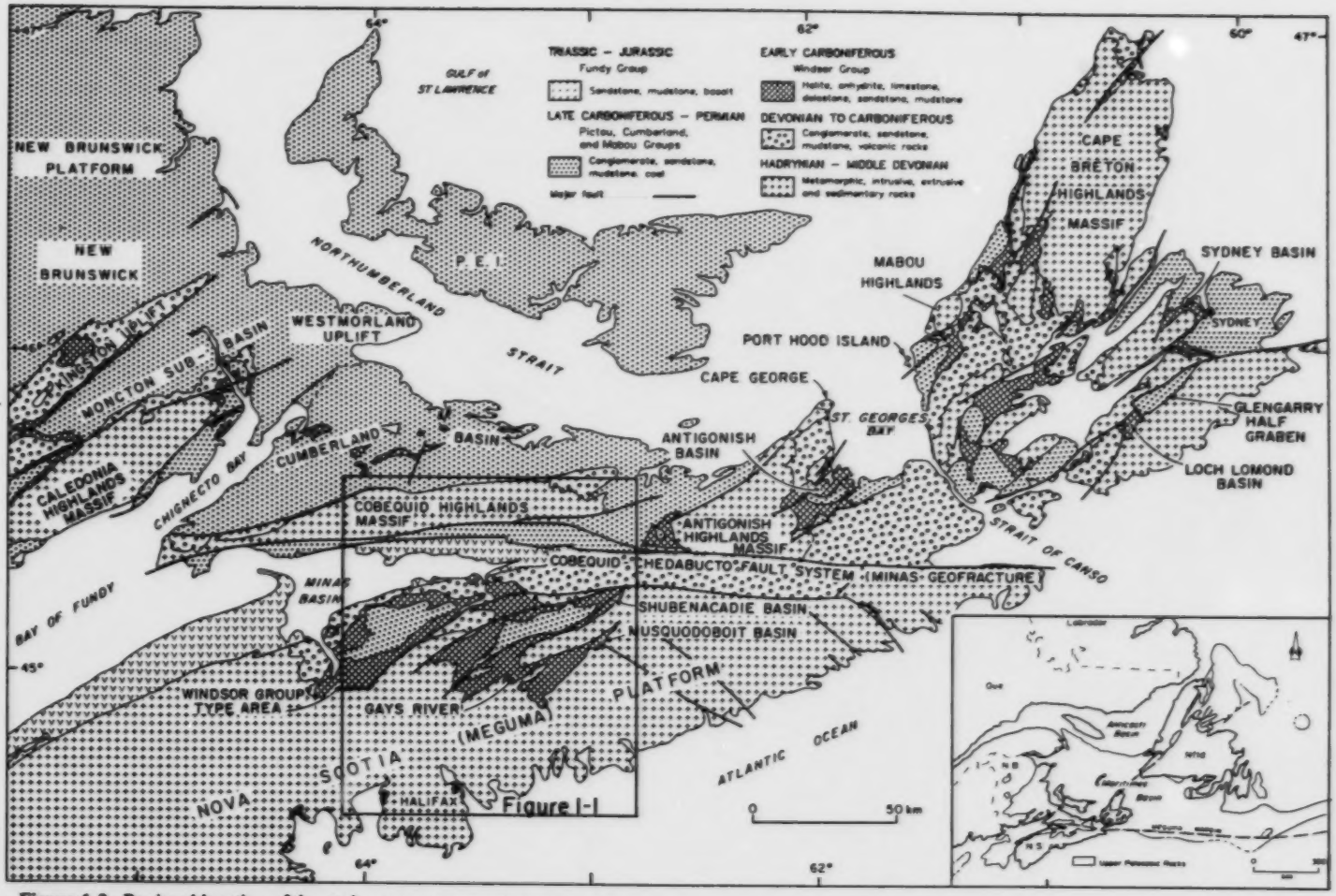


Figure 1-2. Regional location of the study area on a general geology map.

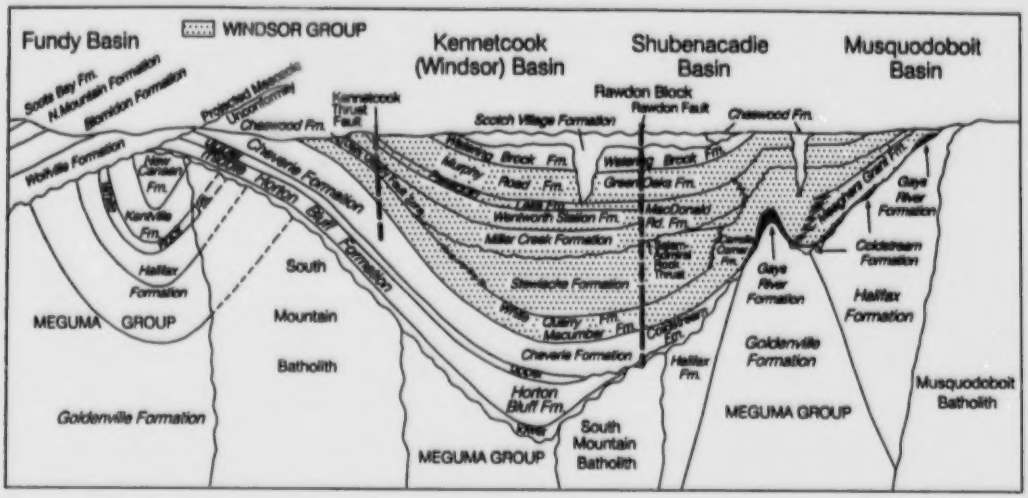


Figure 1-3. Highly simplified diagrammatic representation of the geological map units of the Fundy, Kennetcook, Shubenacadie and Musquodoboit Basins.

disconformably overlies the Horton Group and comprises an interstratified sequence (up to 800 m) of marine evaporite, carbonate and continental redbeds. The Windsor Group contains numerous industrial mineral occurrences including: barite, gypsum, anhydrite, salt, dolomite and limestone as well as occurrences and deposits of base metals including Pb, Zn and Cu.

The Windsor Group is overlain by a locally variable succession of younger Carboniferous age sandstone and mudrock strata including the Mabou (Canso), Cumberland and Pictou Groups (Viséan, Namurian and Westphalian). These represent the return to continental lacustrine and fluvial deposition with the retreat of the Windsor seas. The variably deformed Carboniferous basin fill near the Cobequid-Chedabucto Fault System is unconformably overlain by the southern outcrop margins of the Mesozoic rift basin fill of the Fundy Basin. These Late Triassic age strata comprise medium grained redbed siliciclastics of the Fundy Group (Wolfville Formation). The Carboniferous basin fill is locally overlain by remnants of Early Cretaceous age silica sand and clay correlative with the Chaswood Formation in the Shubenacadie and Musquodoboit Basins.

The Windsor Group rocks of the Musquodoboit and Shubenacadie Basins are bounded to the south and west by metasedimentary rocks of the Meguma Group and plutonic rocks of the Musquodoboit Batholith. The central part of the Colchester County area is a complex of variably folded and faulted Horton Group rocks extending into the St. Marys Basin at the boundary between the Meguma Zone and Avalon Zone, including the Cobequid-Chedabucto Fault System. Small fault blocks or outliers of Windsor Group rocks, including carbonates, are scattered within the predominantly Triassic and Upper Carboniferous rocks in the structurally complicated Cobequid-Chedabucto Fault System south of the Cobequid Highlands (e.g. Upper Economy, Glenholme, East Mountain). The Cobequid Highlands is an uplifted block of the Avalon Terrane and comprises a complex of pre-Carboniferous age (Hadrynian, Neoproterozoic to Devonian) metasedimentary and igneous basement rocks. Carbonate rocks are very rare in the Cobequid Highlands, however metamorphic marble occurrences are described in the western part of Colchester County.

The carbonate rocks described in this report occur primarily in the Hants-Colchester Lowlands in central Nova Scotia. This is an area characterized by gently rolling terrain where elevations rarely exceed 100 m. This Lowland area is bordered to the south and west by the Atlantic (Southern) Uplands and by the Cobequid Highlands in the north. Elevations in the Uplands rise gently to locally abruptly to over 200 m and may exceed 300 m in the Cobequid Highlands. The Lowland area is traversed by numerous low gradient drainage systems characterized by small streams and scattered lakes and still waters. The area is substantially influenced by the Bay of Fundy-Minas Basin tidal system, especially in the Salmon River and Shubenacadie River and their tributaries which have tidal influence extending over 30 km from the Minas Basin. Although the streams and rivers typically have low profiles, there is modest bedrock exposure in the river beds. Tributary streams with steeper profiles on highlands basement rocks of the Meguma Group and Cobequid Highlands, also have moderate outcrop.

Mining activity in the Colchester and Halifax Counties area has concentrated on the economically significant industrial mineral resources including large and small aggregate operations, gypsum, barite, silica sand and clay over the past 100 years. More limited mining of gold occurred in the early 1900s and again in the 1980s as well as base metal production at Gays River in the 1980s. Mineral exploration has historically focussed on base metals and barite in the basal Windsor Group as well as sulphur, salt, potash and gypsum in the Windsor Group.

Gypsum mining has been active in the Shubenacadie Basin for over 40 years with major production at East Milford, Halifax County by National Gypsum. Lafarge Canada Inc. has been producing cement products from their operation near Brookfield for nearly 40 years. The Avon Limestone Member of the Upper Windsor is quarried adjacent to the plant as the primary source of limestone. Cretaceous and Quaternary sediments are primary sources of sand and clay material for Shaw Resources that produces silica sand products at Shubenacadie and Shaw Brick that produces structural clay products at Lantz. Mosher Limestone Company Limited has operated quarries and a dolomitic limestone processing facility at Upper Musquodoboit that has supplied aglime products to the Maritime region for more than 50 years. Carbonate buildups of the Gays River Formation Lower Windsor Group (A Subzone) have been the primary source of dolomitic limestone. Nystone-Division of E-Z-EM Canada Inc. has been producing barite at Upper Brookfield and medical barite products at Debert since the 1980s.

As a result of the discovery and development of the Gays River Pb-Zn deposit in the 1970s and 1980s, the Musquodoboit and Shubenacadie Basins, as well as most other Carboniferous basins in the Province, were extensively explored for base metal and barite deposits associated with the basal carbonates of the Windsor Group. This exploration activity included extensive diamond drilling and resulted in the documentation of limestone and dolomite occurrences and deposits investigated as part of this report in the late 1960s. Exploration for various mineral resources including barite, gypsum, limestone, celestite, sulphur, salt, potash, titanium and petroleum has occurred in several less intensive phases and continues to contribute valuable information on limestone and dolomite resources.

The type area for the Windsor and Horton Groups, which are regionally significant geological units in Atlantic Canada, is located in the adjacent Hants County. A detailed understanding of these rocks was not achieved until Bell (1929) described their litho- and biostratigraphic subdivision. The detailed stratigraphy of the Windsor and Horton Groups in the

Shubenacadie and Musquodoboit Basins (as well as regionally) has been subsequently investigated and described by Moore (1967), Giles and Boehner (1979), Giles *et al.* (1979) and Boehner (1984). The adjacent Shubenacadie Basin in the eastern part of Hants County was the first Carboniferous outcrop area investigated by Giles and Boehner (1979, 1982a) as part of a Carboniferous basin mapping program by the Nova Scotia Department of Mines (now Natural Resources).

The improved understanding of the detailed litho- and biostratigraphy, as well as the structural geology of the Windsor Group, would not have been possible without access to the quarries and the large volume of subsurface data, principally from the hundreds of diamond-drill holes by the gypsum mining and mineral exploration industry. This information has been essential in providing the basis for a greater understanding of the geology and mineral resource potential of the Windsor Basin (and others). The basins contain major salt, gypsum, anhydrite, limestone, dolomite, barite, silica sand, clay resources and other industrial mineral potential and have significant base metals, silver and gold. The carbonate rocks of the Windsor Group are the key units used for lithostratigraphic subdivision and local and regional correlation. These carbonates are very significant as sources of limestone and dolomite mineral resources.

GENERAL WINDSOR GROUP STRATIGRAPHY

The Windsor Group is one of the most important stratigraphic and economic units in the late Paleozoic basins of Atlantic Canada. It comprises a complex succession of interstratified evaporites including gypsum, anhydrite, salt and potash, fine- and coarse-grained redbeds, and fossiliferous marine carbonates, all of which constitute mineral commodities of economic interest. The thickness ranges from a few metres up to more than 1500 m with 750-1000 m typical. It is widely distributed throughout Atlantic Canada.

The Windsor Group extends throughout much of mainland Nova Scotia, and is also represented in southern New Brunswick and southwestern Newfoundland. It extends throughout the Gulf of St. Lawrence, and appears in surface exposure on the Magdalen Islands of Quebec. The Windsor Group was originally defined by Bell (1929, 1958) for a sequence of interstratified red-maroon siltstones, marine carbonates (limestone to dolostone), gypsum, salt and anhydrite. Bell (1929) estimated a minimum total thickness of 472 m in the structurally complicated type area at Windsor, however it is now known to be substantially thicker. Regionally, Windsor Group strata conformably or disconformably overly the continental siliciclastics of the Horton Group, and locally rest with angular unconformity upon older basin fill (Late Devonian-Early Carboniferous). In some areas it onlaps directly onto basement with angular unconformity or nonconformity (e.g. Shubenacadie Basin and Loch Lomond Basin). The Windsor Group is generally overlain conformably by mudrocks and evaporites of the basal Mabou Group. In some areas it is unconformably overlain by younger Late Carboniferous age units.

The Windsor Group in the area was biostratigraphically subdivided by Bell (1929) into two major faunal zones and five subzones based mainly upon their contained Brachiopoda, Cephalopoda and Cnidaria. The Lower Windsor zone of *Composita dawsoni* was subdivided into the A Subzone, the basal limestone (characterized by a paucity of megafauna), and the B Subzone, characterized by *Diodoceras avonensis*. Bell (1929) subdivided the Upper Windsor zone of *Martinia galataea* into C Subzone, characterized by *Dibunophyllum lambii* and *Nodosinella (Paleocrisidia) priscilla*; D Subzone, characterized by *Productus (Ovatia) semicubiculus*; and E Subzone, characterized by

Caninia dawsoni and *Chonetes politus (Tournquistia polita)*. The names and ranges of these forms and others have been modified by Moore and Ryan (1976).

The base of the Windsor Group in Hants County is marked by a thin laminated basal limestone known as the Macumber Formation. Bell (1929) also included an underlying calcareous, grey quartzite and limestone conglomerate unit (Pembroke breccia of Lavoie*et al.*, 1995) as part of the Windsor Group. In the type area, the basal limestone is approximately 4 m thick. The underlying quartzite unit, locally bearing *Schizodus cheverensis* on its upper surface, is 6.7 m thick and conformably overlies the Cheverie Formation of the Horton Group. Near the type area, the basal limestone was subsequently named the Macumber Formation (Weeks, 1948), but in other areas it has been referred to as A_1 limestone. It is usually overlain by a thick section of gypsum and anhydrite, sometimes informally referred to as the basal anhydrite (in Hants County this section is named the Carrolls Corner or White Quarry Formation). The name Pembroke Formation introduced by Weeks (1948) is abandoned and the informal term Pembroke breccia is now used to refer to the variety of limestone breccia and conglomerate associated with the near surface exposures of the Macumber Formation. (Note: The term Pembroke Formation is used in the occurrence descriptions in this report reflecting terminology at the time of the study). The Macumber Formation and related Pembroke breccia occur in outcrop primarily along the northwestern part of the Windsor Basin.

Investigations in the southeastern extremity of the Shubenacadie Basin and Musquodoboit Basin by Giles and Boehner (1979) indicated that the basal A Subzone limestone equivalent was deposited upon pre-Carboniferous basement rocks (overstepping the Horton Group pinchout), and locally developed a varied flora and fauna. In these carbonate banks it reaches thicknesses of over 45 m and was named the Gays River Formation by Giles *et al.* (1979). These buildups are known to be present along the western border of the Shubenacadie Basin near Nine Mile River in eastern Hants County and are especially well developed near Gays River and around the borders of the Musquodoboit Basin in Halifax County (Giles *et al.*, 1979; Boehner *et al.*, 1989a).

The thick overlying anhydrite was named the Carrolls Corner Formation and it is overlain in the deeper parts of the basins by the Stewiacke Formation (Giles and Boehner, 1979). This is a thick (up to 300 m) salt unit that is well documented in the Shubenacadie Basin. It overlies and, in part, may be a lateral equivalent of the Carrolls Corner Formation (Boehner, 1984). These two units have a combined minimum thickness of approximately 400 m. The salt occupies a similar position in the Windsor area (Moore and Ryan, 1976) and is the most important salt unit in central Nova Scotia.

In most cases, the thick A Subzone sulphate-halite units are overlain by the B Subzone cyclic sequence consisting of interstratified fossiliferous marine carbonates, siltstones and evaporites including thin halite beds. In the Shubenacadie Basin area, this section comprises the Macdonald Road Formation (Giles and Boehner, 1979), which includes a series of thin siliciclastic rich carbonate members (typically <3 m thick) as subdivisions. Thick, high purity biohermal facies (up to 15 m thick) of one or more of these carbonate members are of particular interest as potential limestone resources (e.g. Miller or Maxner limestones of Bell, 1929). Correlative bioherms are known to occur with the Mosher Road, Cloverdale and Ryan Brook members in the Shubenacadie Basin. The MacDonald Road Formation has a total thickness of approximately 170 m. The MacDonald Road Formation was subdivided into six carbonate units defined as members (Giles and Boehner, 1979) which are typically of significant thickness, and which are lithologically distinct. Associated rock

types, although not formally named, are often useful to corroborate the identification of specific members. The distinctive carbonate members recognized in the MacDonald Road Formation include in ascending order: the Mosher Road, Cloverdale, Ryan Brook, Hardwoodlands, North Salem and McPhee Corner members. The carbonate members of the MacDonald Road Formation are laterally extensive and may be correlated throughout the Shubenacadie Basin and into the adjacent type area of the Windsor Group near Windsor.

The MacDonald Road Formation is overlain with possible slight disconformity by a sequence of alternating fossiliferous marine carbonates, red siltstone and locally gypsum and anhydrite (in a saline facies) called the Green Oaks Formation (Giles and Boehner, 1979; Boehner, 1984). The lithostratigraphy of the Upper Windsor Zone carbonate units was described by Moore (1967) and can be readily correlated throughout the Minas Sub-basin area as laterally extensive transgressive-regressive marine carbonate sheets. The thickness of this interval ranges from 137 m in the Shubenacadie Basin to over 730 m in the incomplete composite section of the Green Creek area (Moore, 1967).

Individual carbonate members were named by Bell (1929) who used the terms Avon and Kennetcook for two Upper Windsor carbonate units, which were also used by Moore (1967), who described the lithostratigraphy of the Upper Windsor carbonate members in the Minas Sub-basin. In addition, Giles and Boehner (1979) introduced the Green Creek and Kent Road members to complete the subdivision of the Upper Windsor. The carbonate members of the Green Oaks Formation are in ascending order: Herbert River (C Subzone), correlative Musquodoboit Limestone in the Musquodoboit Basin, (C Subzone), Kent Road (C Subzone), Shubenacadie (C Subzone), Green Creek (C Subzone), Avon (D Subzone), Meander River (D Subzone), Wallace Point (D Subzone) and Kennetcook (E Subzone) limestone members.

ACKNOWLEDGMENTS

During the field work, D. Murphy, I. G. MacDougall and D. G. Cormier ably discharged their duties as field assistants.

The writer expresses his appreciation for the assistance given by chemists of the Nova Scotia Research Foundation, Truro, and the analysts of the Nova Scotia Department of Mines who used the laboratory facilities in the Chemical Engineering Department of the Nova Scotia Technical College, Halifax.

CHAPTER 2. COLCHESTER COUNTY

GENERAL GEOLOGY

Most of the limestones and dolomites in Colchester County are found in the Windsor Group marine sedimentary rocks. One occurrence of crystalline limestone is found in the Cobequid Fault Zone near Londonderry and another crystalline marble occurrence is found in the banks of North River, north of Lower Five Islands that has been assigned to the Hadrynian Jeffers Formation (Donohoe and Wallace, 1982; Pe-Piper and Piper, 1987) now Jeffers Group.

The Windsor Group sedimentary rocks are found distributed throughout the area, with the largest concentration being the Gays River Bank Complex in the Shubenacadie Basin area in the southern part of the County. This Complex forms a major carbonate outcrop area trending northeast-southwest approximately parallel to the regional basement structural trend in the Nova Scotia Platform. It is situated on paleotopographic high areas immediately updip from the pinchout line of Horton Group continental clastics in the Shubenacadie Basin. The lower contact is a prominent angular unconformity with significant paleorelief on the Cambro-Ordovician Meguma Group metasedimentary rocks (Boehner *et al.*, 1989a). Isolated beds of slightly metamorphosed Lower Windsor Group limestone, thought to be Pembroke Formation (Stevenson, 1958) occur at Manganese Mines and the Penny Mountain areas near Truro. The following is the usual stratigraphic sequence encountered in the study area showing the age relationship of the different limestones described.

Pleistocene	Sand and gravel till	
Cretaceous	Clay and silica sand	
Lower Carboniferous (Windsor Group)	Upper Windsor	shales, siltstones, thin beds of limestone and dolomite
	Lower Windsor	shale, gypsum, dolomite, conglomerate (local)
Cambrian-Ordovician (Meguma Group)	Halifax Formation	slate
	Goldenville Formation	quartzite
Hadrynian	Jeffers Group	grey, white marble

At Pleasant Valley near Brookfield, Lafarge Canada Inc. has been operating a cement factory since 1964 with an average annual production from their quarry of 600 000 t. The limestone mined is a natural cement stone; no additives are necessary to manufacture Normal Type 10 cement.

ALTON AREA

ALTON (At-1-1)

This occurrence is located 2.57 km northeast of Alton and 1.93 km southeast of Brentwood. This area is approximately 20 km south of the Town of Truro and just east of the old Truro-Halifax highway. The limestone outcrops in a quarry on the property of Sandy Munro, 563.9 m southwest of his house. This quarry was once serviced by a road and by a branch line of the railroad. The Munro farm is on the Brentwood to Little River road, 1.93 km southeast of Brentwood (Fig. 2).

Description

The limestone varies between a grey, hard, dense, massive, highly fossiliferous, B_1 Subzone (Bell, 1929) Windsor Group limestone on the northern side of the quarry, to a light grey, very hard, compact, fine grained, Windsor Group limestone with few fossils, on the southern side of the quarry. The limestone can only be seen outcropping on the southern side of the quarry. On the northern side, only rubble can be found. The bedding is very poorly developed and massive with a light grey, fairly smooth, weathered surface. Calcite is not very abundant. There is a large variety of fossils including several types of brachiopods which are by far the most numerous fossil type, pelecypods, crinoid stems, corals, three types of bryozoans, a few gastropods and some cephalopods (both coiled and straight) (Fig. 3). All species are well developed, and some are large. There does not appear to be any particular orientation except that the crinoid stems and stick bryozoans are parallel to the bedding. The strike and dip could not be determined with certainty because of the small amount of outcrop and the massive nature of the limestone. It appears, however, to be trending in a N 60°E direction.

The limestone here was originally quarried for use in the Londonderry iron operation around 1900. A spur railway line was put in from the regular Canadian National Railway line, approximately 1.6 km to the west from where it was shipped to Londonderry. The quarry is thought to be about 24.5 m in depth, but it is now filled with water (Fig. 4). The limestone might have been mined at one time because there is an old shaft in the vicinity of the quarry.

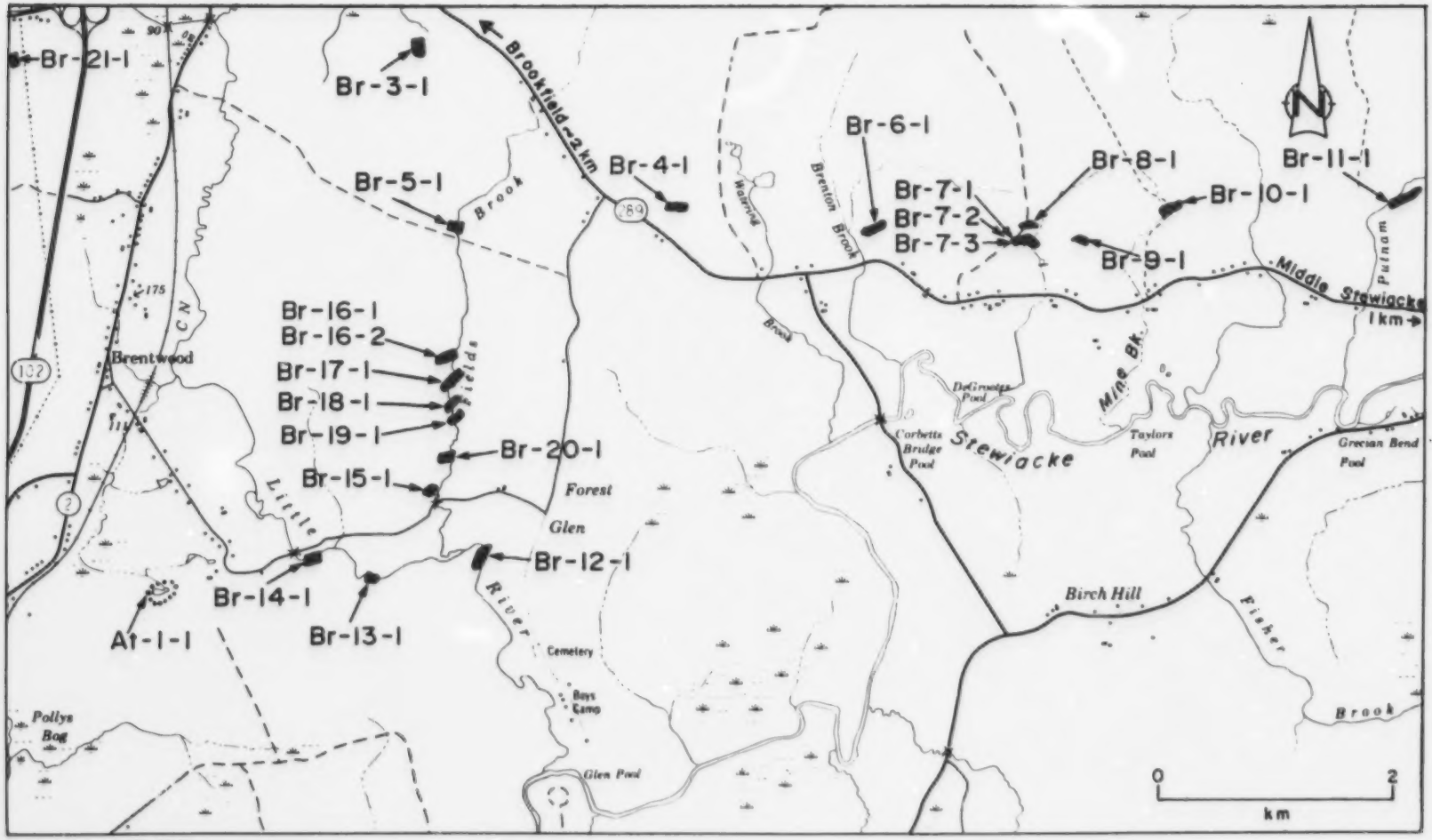
There is no indication as to the thickness of limestone or the depth of overburden in the surrounding area. Gypsum outcrops to the east of the quarry and northwest of the Munro house.

The area is easily accessible, however there might be a great thickness of overburden away from the quarry. At the Munro farm house a well was drilled 33.5 m without striking bedrock.

Sample At-1-1 was taken on the southern side of the quarry.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
At-1-1	43.00%	1.05%	0.71%	54.65%	0.28%



Ref. Map 11E/03

Figure 2. Location map of limestone and dolomite occurrences sampled in the Alton and Brookfield areas, Colchester County (11E/03).

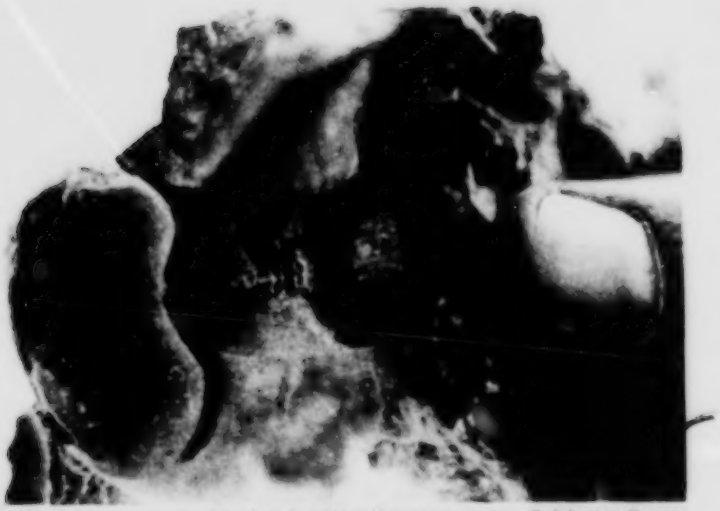


Figure 3. *Didoceras avonensis* found at the Alton limestone quarry, Colchester County (At-1-1). The fossils are very abundant and very well preserved here.

Figure 4. Quarry of B_1 limestone found at Alton, Colchester County (At-1-1). Quarry has been filled with water.

BEAVER BROOK AREA

BEAVER BROOK (BB-1-1) (BB-2-1) (DRILLING)

This occurrence is located along the eastern branch of Beaver Brook on the property of Whyman H. Yuill. The limestone was quarried to some extent in the early part of the Twentieth Century. The outcrop is 0.97 km east of the main road between Beaver Brook and Old Barns. The quarry can be reached from a farm road which services the Yuill field. The limestone is found in a 7.6 m high embankment which strikes southeast away from the Brook. There are several other limestone occurrences farther up the Brook, but these are very argillaceous and of very poor quality (Fig. 5).

Lafarge Canada Inc. drilled this deposit using drill targets obtained from a geophysical survey (Levaque *et al.*, 1988). They estimated a tonnage of 250 000 t of high calcium limestone approximately 11.6 m below the surface in a bed approximately 7.5 m thick.

Description

The limestone is grey, hard, massive, medium grained, Windsor Group limestone with reddish iron staining. This limestone is near the bottom of the Windsor Group section and is associated with gypsum which is found to the southwest. The limestone is similar to limestone of the Pembroke Formation. Some sections are conglomeratic containing limestone fragments from an underlying limestone. The bedding is very poorly developed and extensively fractured. The weathered surface is red and smooth. Dip and strike cannot be determined because of the fracturing and massive nature of the limestone, however in some sections it appears to be flat lying.

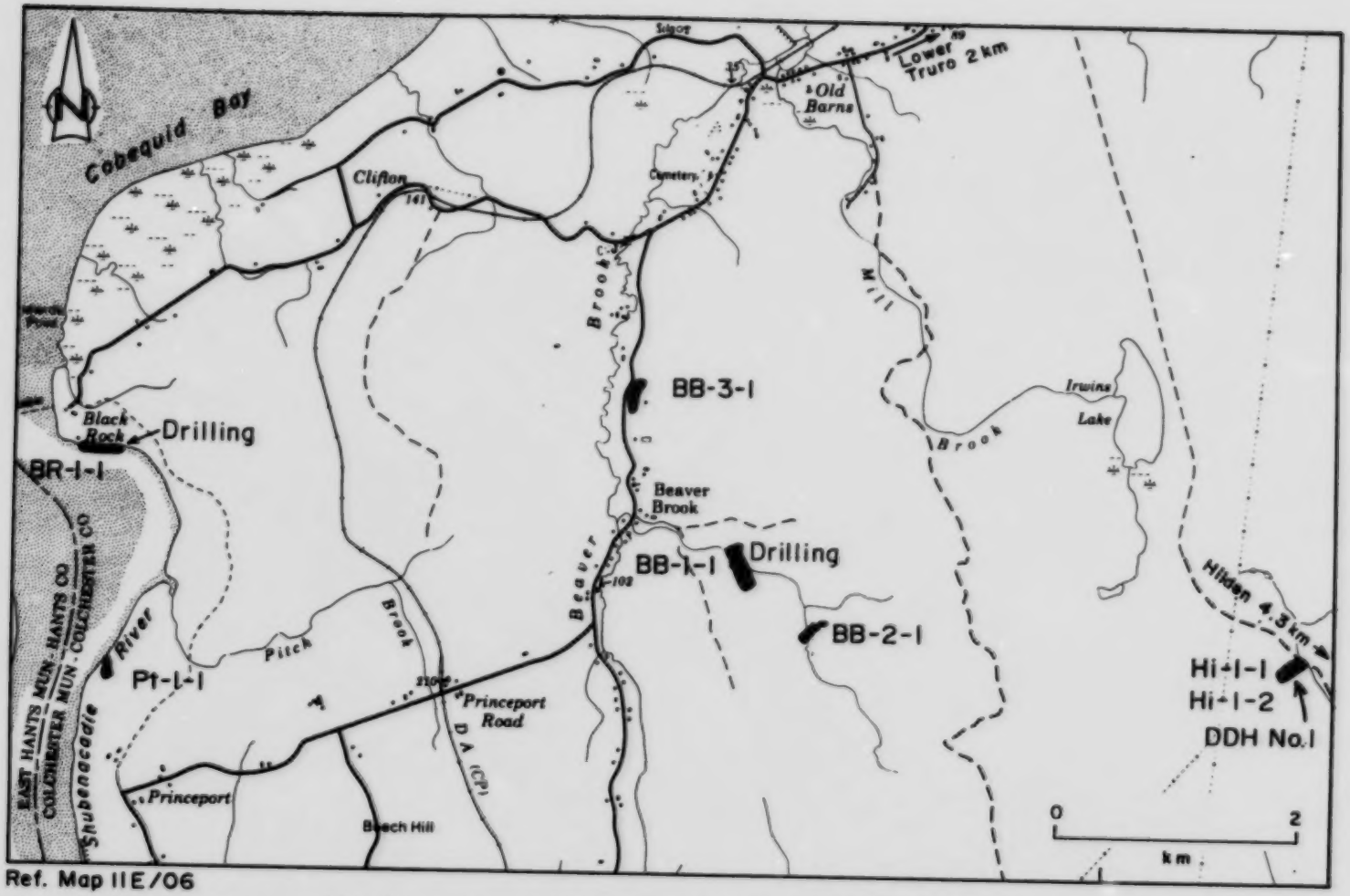
The limestone appears to be at least 12 m thick with very little overburden. The surrounding area is open and easily accessible.

Sample BB-2-1 was taken 427 m southeast along the eastern branch of Beaver Brook from the main quarry of limestone and sample BB-1-1. The dolomite can be traced along the Brook for 129.5 m. It is a hard, dense, argillaceous, brownish-grey, Lower Windsor Group dolomite.

Several other limestone beds are found farther up the Brook, but these are thin, impure and very inaccessible. Limestone can be found outcropping as far as 1.6 km up this Brook from the quarry.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
BB-1-1	43.15%	1.28%	0.41%	55.00%	0.31%
BB-2-1	45.50%	2.08%	3.08%	30.40%	18.70%



Ref. Map 11E/06

Figure 5. Location map of limestone and dolomite occurrences sampled in the Beaver Brook, Black Rock, Hilden and Princeport areas, Colchester County (11E/05).

BEAVER BROOK (BB-3-1)

This occurrence is located at Beaver Brook on the eastern side of the Beaver Brook-Clifton highway, 1.6 km south of the Clifton-Black Rock turnoff. The limestone can be found outcropping in the ditch on the eastern side of the road. The limestone can be traced 183 m along the ditch in various spots. This may be a continuation of BB-1-1 (Fig. 5).

Description

The limestone is a dark grey, very hard, dense, massive, Windsor Group limestone with a reddish coating. The bedding is very poorly developed with a reddish-brown, smooth, weathered surface. There are numerous small cavities partially filled with calcite crystals. This limestone appears to be part of Stevenson's (1958) Pembroke Formation of the Lower Windsor Subzone. The strike and dip could not be measured because of the lack of outcrop and massive nature of the limestone.

There is no indication as to the thickness or areal extent of the limestone. The overburden appears to be <3 m.

The area in the vicinity of the outcrop is heavily wooded towards the east and open fields towards the west. The area is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
BB-3-1	43.40%	0.89%	0.57%	53.35%	1.48%

BLACK ROCK AREA

BLACK ROCK (BR-1-1) (DRILLING)

The occurrence of limestone is located at Black Rock on the southern shore of Cobequid Bay, approximately 16 km west of Truro. The outcrop is at the mouth of the Shubenacadie River, on the eastern shore, southeast of the telephone cable. The limestone outcrops 294 m eastward along the shore from Black Rock farm. The banks of the River are formed by the limestone. A large amount of the limestone is covered when the tide comes into the River (Fig. 5). Levaque *et al.* (1988) provided an interpretive cross-section (Fig. 6).

Description

This is a grey, hard, medium grained, laminated, Windsor Group limestone belonging to the A Subzone (Bell, 1929) (Fig. 7). Numerous thin, limy sandstone layers can be seen throughout the section. The bedding is very well developed with numerous small folds and crenulations (Fig. 8). The weathered surface is light grey and smooth. There are numerous clusters of calcite crystals (dog-tooth spar), plus numerous sigmoidal gas veins. The limestone contains a large amount of red iron staining in various locations with large amounts of other impurities throughout. This is the contact between the Windsor, Horton and Triassic Groups. It strikes east and dips 20° south.

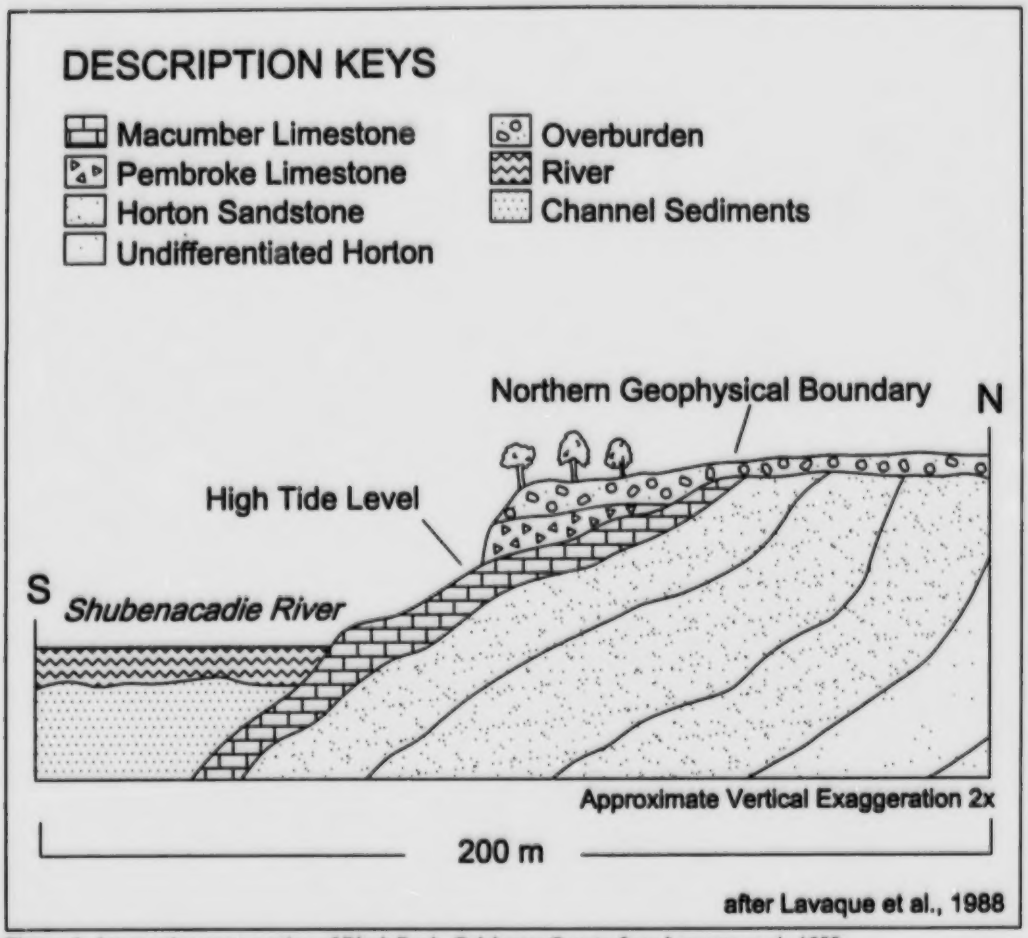


Figure 6. Interpretive cross-section of Black Rock, Colchester County from Levaque *et al.*, 1988.

The deposit was drilled by Lafarge Canada Inc. in 1988, completing six holes totalling 185 m (Levaque *et al.*, 1988). Chemical analyses were done on three holes and are in Appendix 1.

The following conclusions were made by Lafarge Canada Inc. as a result of their 1988 drilling and geophysical programs. The Macumber limestone is highly folded, and dips steeply to the south, making the thickness and width variable. The mineable tonnage was estimated to be 780 000 t assuming an average thickness of 7.5 m and a width of 50 m. The length of the deposit was extrapolated from the area drilled west to the tip of Black Rock. This gives the deposit a length of approximately 800 m.

Much of the deposit is exposed along the Shubenacadie River. When the tide is high, it covers much of the deposit, therefore creating problems with water control that could become costly (Levaque *et al.*, 1988).

Figure 7. Laminated basal Windsor limestone found near the mouth of the Shubenacadie River at Black Rock, Colchester County (BR-1-1).

Figure 8. Contorted beds of basal Windsor limestone, Black Rock, Colchester County (BR-1-1).

The limestone is at least 6-7.6 m thick with very little overburden. The surrounding area is easily accessible.

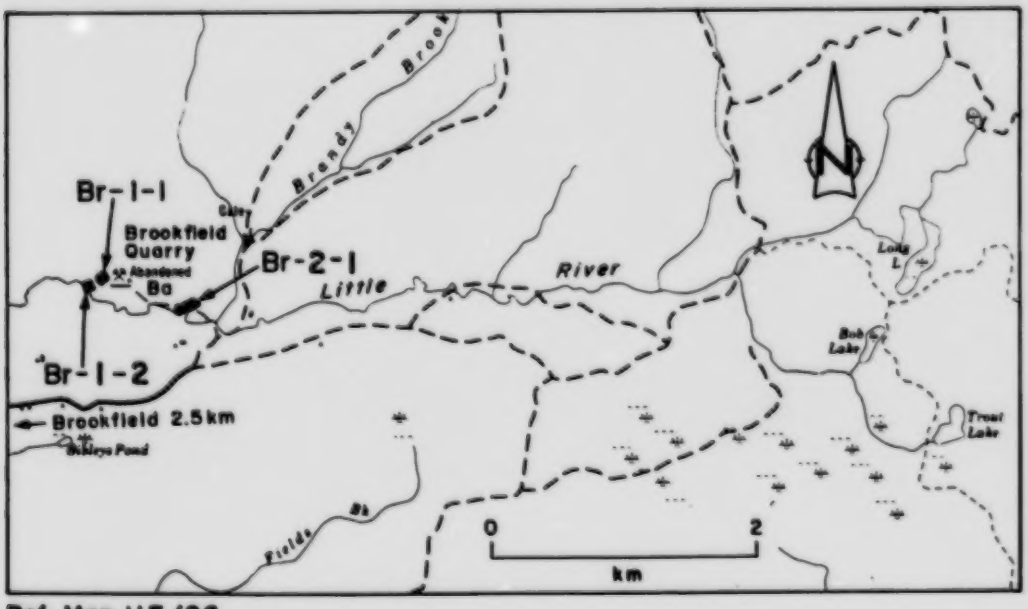
Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
BR-1-1	42.25%	2.54%	0.87%	53.05%	0.38%

BROOKFIELD AREA

BROOKFIELD (Br-1-1)

Outcrops of the occurrence are located 3.7 km northeast of Brookfield along the northern side of Little River. The limestone is associated with the Brookfield barite quarry. Outcroppings of the limestone can be found west of the quarry in the side of the hill approximately 30.5 m in elevation above Little River. This limestone forms the upper part of the contact between the Windsor Group and the underlying Horton Group rock. The barite is a vein deposit in the Horton Group sedimentary rocks (Fig. 9).



Ref. Map 11E/06

Figure 9. Location map of limestone and dolomite occurrences sampled in the Brookfield area, Colchester County (11E/06).

Description

This Windsor Group limestone is hard, dense, dolomitic and brecciated. The upper section is massive with the limestone becoming more platy towards the bottom. The lower section is brecciated. The weathered surface is brown and rough. Calcite stringers are common, and calcite crystals are found along the veins. No fossils were found. The beds strike N 70° E and dip 22° NW.

The limestone is at least 3 m thick, but there is no indication as to the total thickness. The overburden is very light.

The surrounding area is very hilly and lightly wooded. The area is easily accessible by the road which serviced the barite deposit.

The limestone does not appear to be extensive enough to be of any economic value.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-1-1	42.10%	6.22%	3.23%	36.50%	11.70%

BROOKFIELD (Br-1-2)

This occurrence is located southwest of the barite deposit at Brookfield. This area is 3.7 km northeast of Brookfield and is in the Little River valley. The sample is a continuation of Br-1-1 which is found outcropping farther up the hill on the northern side of the River. The limestone can be found outcropping along the side of the River for a distance of 91 m. Outcrops can also be seen at various locations on the side of the hill (Fig. 9).

Description

The limestone is grey, hard, dense, thinly bedded, dolomitic, Windsor Group limestone. The weathered surface is light brown to grey. Bedding is well developed. A few calcite stringers are in evidence. It strikes N 64° W and dips 26° NE.

The limestone outcrops from Little River to 30.5 m above the River and dips into the hill making the limestone at least 18 m thick with very little overburden. Although the limestone is thick, the rock dips into the hill where it is cut off by the Horton Group, lending very little areal extent to the limestone. The surrounding area is only lightly wooded and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-1-2	44.10%	3.80%	3.05%	36.50%	13.00%

BROOKFIELD (Br-2-1)

This occurrence is located southeast of Br-1-1 and the barite quarry. This area is 3.7 km northeast of Brookfield. The limestone can be found outcropping along the northern bank of the road that runs to the barite quarry. It also runs along the southern side of the Little River which runs along the side of the quarry road at this point. The limestone dips to the southwest underneath the River (Fig. 9).

Description

The limestone is hard, dark grey, thinly bedded, argillaceous, Windsor Group limestone. The bedding is well developed with a light brown, smooth, weathered surface. The limestone is slightly laminated. There are numerous calcite stringers throughout. It strikes N 80° W and dips 35° SW.

Maximum thickness is 4.6 m. The limestone forms the contact zone with the Horton Group. The contact is not visible even though the overburden is not too great over the area. The area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-2-1	37.80%	10.30%	5.30%	44.10%	1.98%

BROOKFIELD (Br-3-1)

This occurrence is located approximately 2 km southeast of the Brookfield intersection. The limestone can be found outcropping in an area south of the Brookfield-Middle Stewiacke road along an old logging road. This logging road joins the Middle Stewiacke road 2.57 km southeast of Brookfield. Outcrops of this limestone can be found 396 m southwest of the Middle Stewiacke road (Fig. 2).

Description

This is a dark grey, hard, porous, slightly fossiliferous, massive, high calcium, Windsor Group

limestone. The bedding is very poorly developed with a brown, rough, weathered surface. It contains a few brachiopods and some gastropod cavities. There are numerous solution cavities, but very little secondary calcite.

The dip and strike could not be measured due to the massive nature of the limestone. It appears, however, to be striking in a northwesterly direction.

There is no indication as to the thickness or extent of the limestone. The amount of overburden appears to be slight. The limestone is surrounded by gypsum. The terrain is very rugged and typical of land underlain by gypsum. The area is heavily wooded.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-3-1	43.50%	1.06%	0.80%	54.40%	0.40%

BROOKFIELD (Br-4-1)

This occurrence is located 229 m up a small brook which crosses the Brookfield-Middle Stewiacke road approximately 4.5 km east of the Brookfield intersection. The limestone outcrops in a small ridge on the western side of the brook. The brook cuts off the ridge. There is another very thin bank of limestone 122 m farther up this brook, but it was not sampled due to the lack of thickness and poor quality of the limestone (Fig. 2).

Description

This is a dark grey, hard, dense, thickly bedded, Windsor Group limestone. The bedding is well developed with a rough, light grey, weathered surface. There is very little calcite associated with the limestone. It strikes N 65° E and dips 20° SE.

The limestone is at least 3 m thick with little indication as to the total thickness. The limestone outcrops on the surface with little or no overburden. The surrounding area is heavily wooded and is not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-4-1	40.00%	7.70%	2.56%	48.70%	0.92%

BROOKFIELD (Br-5-1)

Limestone outcrops approximately 1.6 km southwest along Fields Brook from where it crosses the Brookfield-Middle Stewiacke road. The area is 3 km southeast of the Brookfield intersection. The limestone can be found in and on both sides of Fields Brook, 76 m upstream from where a logging road crosses the Brook (Fig. 2).

Description

The limestone is dark grey, hard, compact, slightly fossiliferous, impure, Windsor Group limestone (Fig. 10). The bedding is well developed with a smooth, brown, weathered surface. A few cavities can be seen. The only fossils noted were a few, very small brachiopods. It contains numerous calcite stringers. It strikes N 68° W and dips 66° SW.

Figure 10. Outcrop of limestone located on Fields Brook, southeast of Brookfield, Colchester County (Br-5-1).

The limestone is at least 6 m thick with little or no overburden. The surrounding area is only lightly wooded and was at one time open pasture land. The area is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-5-1	34.70%	17.50%	3.99%	41.90%	0.90%

BROOKFIELD (Br-6-1)

This occurrence outcrops approximately 6 km southeast of Brookfield on the northern side of the Brookfield-Middle Stewiacke road. The limestone is found on a small tributary of Brenton Brook which crosses the road 0.64 km east of the Birch Hill road. This limestone was quarried and burned by farmers 30-40 years ago. The quarry has, however, grown in. The quarry is 183 m north of the road (Fig. 2).

Description

This is a dark grey, hard, dense, thinly bedded, Windsor Group limestone. The weathered surface is light grey to brown with a well developed bedding. Calcite stringers are numerous. It strikes N 65° E and dips 57° SE.

The limestone is at least 4.6-6.1 m thick with very little overburden. The limestone can be found outcropping on either side of a small tributary of Brenton Brook and strikes across the tributary.

The surrounding land was cleared at one time but has since grown over with alder bushes. It is in an easily accessible area.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-6-1	38.80%	9.10%	2.75%	47.90%	0.60%

BROOKFIELD (Br-7-1) (Br-7-2) (Br-7-3)

This occurrence is located approximately 7 km southeast of Brookfield along the northern side of the Brookfield-Middle Stewiacke road. Outcroppings of the limestone can be found 335 m up a small brook which crosses the Brookfield-Middle Stewiacke road, 1.6 km east of Brenton Brook. The brook branches 30.5 m north of an artificial pond. The limestone outcrops on three branches of the brook and is found at various locations along the banks of these three branches (Fig. 2).

Description

The limestone is dark grey, hard, petroliferous, dense, medium grained, thickly bedded, Windsor Group limestone. The bedding is well developed with a grey, smooth, weathered surface. Some calcite stringers are in evidence.

The strike varies at different outcrops. At Br-7-1, the strike is N 75° E and dip is 63° SE. At Br-7-2, which is a channel sample, the limestone strikes N 55° E and dips 28° SE.

A continuous section cannot be seen, but the limestone appears to be 15-18 m thick. It can be traced along strike for a distance of 244 m. The overburden is only slight in the vicinity of the outcrop. The area is easily accessible.

Br-7-3 was taken from the eastern branch of this brook, Br-7-2 (channel sample) was taken from the middle branch and Br-7-1 was taken from the western branch.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-7-1	42.00%	4.70%	0.96%	51.70%	0.47%
Br-7-2	41.00%	5.46%	1.40%	50.50%	0.73%
Br-7-3	42.10%	3.20%	1.19%	51.50%	1.10%

BROOKFIELD (Br-8-1)

Located on the same brook as Br-7-2, this occurrence outcrops 18 m up the middle branch of this brook from Br-7-2. This limestone is underlying the limestone sampled at Br-7-2 and is near the Horton-Windsor contact. The limestone outcrops in the banks on either side of this brook. This area is approximately 7 km southeast of Brookfield (Fig. 2).

Description

This limestone is grey, hard, dense, fossiliferous, thinly bedded, Windsor Group limestone. The bedding is well developed with a smooth, light grey, weathered surface. The only fossils noted are brachiopods, and these are seen mainly on the weathered surface. There appears to be only one species of brachiopod. The fossils are not numerous. The limestone is very argillaceous. It strikes N 52° E and dips 36° SE.

The banks of the brook rise 6-9 m above the brook on either side. The limestone outcrops in these banks and is from 4.6-6 m thick with very little overburden. The surrounding area has been cleared and is accessible although very hilly.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-8-1	37.30%	11.00%	4.80%	44.10%	1.05%

BROOKFIELD (Br-9-1)

This occurrence is located on the eastern branch of the brook where Br-7-3 outcrops. The limestone can be found outcropping on both sides and in this brook 731.5 m north from the Middle Stewiacke-Brookfield road. The area is 8 km southeast of Brookfield (Fig. 2).

Description

This limestone is light grey, hard, dense, slightly fossiliferous, thinly bedded, Windsor Group limestone. The bedding is well developed with a smooth, light brown, weathered surface. The fossils can easily be seen on the weathered surface and are mainly brachiopods and crinoid stems. There are some thin calcite stringers. This limestone is very similar to Br-8-1 which is located 427 m to the west. The occurrence is probably a continuation of Br-8-1. The strike is N 55° E and the dip is 24° SE. The limestone is near the Horton-Windsor contact.

The limestone does not appear to be any thicker than 6 m with 3-4.6 m of overburden covering the rock. The surrounding area is heavily wooded and not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-9-1	38.20%	9.80%	3.88%	46.10%	1.10%

BROOKFIELD (Br-10-1)

This occurrence is located on the Mine Brook in the Middle Stewiacke area, approximately 8.5 km southeast of Brookfield on the northern side of the Brookfield-Middle Stewiacke road. The limestone in this area was quarried in the 1890s to some extent for the barite which is associated with it. A shaft was put into the limestone. This quarry is serviced by a road which runs to the barite showing. The shaft is located 731.5 m up this wood road (Fig. 2).

Description

This is a dark grey, hard, dense, massive, Windsor Group limestone conglomerate. The bedding is very poorly developed with a light brown, rough, weathered surface. The limestone conglomerate has been replaced by barite. In parts of the limestone, the barite forms a breccia whereas in other sections it completely replaces the limestone. The conglomerate also contains some carbonaceous clasts. There are numerous cavities containing secondary calcite. Calcite stringers are also abundant.

The strike and dip could not be determined because of the massive nature and slumping in the quarry. It does appear, however, to be fairly flat lying. There is no indication as to the thickness of the limestone. The overburden is only slight. This limestone conglomerate is in contact with Horton Group sedimentary rocks.

The Brookfield barite deposit is found in Horton Group sedimentary rocks, but this Middle Stewiacke barite occurrence is found in Windsor Group limestone along the Horton-Windsor contact.

The surrounding area is wooded, but is easily accessible by a woods road. The limestone does not appear to have the quality or quantity to be of economic importance. The barite, however, should possibly have additional work done on it.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-10-1	40.50%	6.10%	1.80%	50.50%	0.60%

BROOKFIELD (Br-11-1)

Occurrence Br-11-1 is located approximately 10 km southeast of Brookfield on the northern side of the Brookfield-Middle Stewiacke road. The limestone outcrops on the eastern side of Putnam Brook, 671 m upstream from the Brookfield-Middle Stewiacke road. The limestone outcrops in the side of a 12 m high embankment along the side of the Brook. This limestone was quarried years ago, and was used by local farmers for their fields (Fig. 2).

Description

The limestone is a light grey, hard, dense, Windsor Group limestone conglomerate. The bedding is poorly developed with a light brown, smooth, weathered surface. The conglomerate consists of different sized, rounded limestone clasts in a limestone matrix. It strikes N 40° E and dips 43° SE. The limestone is 6-7.6 m thick with very little overburden. The conglomerate is at the Horton-Windsor contact. It is overlain by gypsum and underlain by Horton Group shale.

The area is heavily wooded and hilly and not easily accessible. The limestone deposit does not appear to be of any economic value. The sample taken was from one of the clasts of the conglomerate.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-11-1	42.50%	1.77%	1.60%	53.30%	0.55%

BROOKFIELD (Br-12-1)

This occurrence is located on Little River. The area is approximately 5.5 km southeast of the Village of Brookfield. This area is 1.6 km north of where Little River empties into the Stewiacke River. This occurrence is south of the Brentwood-Forest Glen road. The limestone outcrops in and on the eastern side of Little River at the base of a 12 m embankment. The occurrence is 1792 m south, downstream from where Little River crosses the Brentwood-Forest Glen road (Fig. 2).

Description

The limestone is brown, hard, compact, dolomitic, thickly bedded, Upper Windsor Group limestone. The bedding is well developed with a light brown, smooth, weathered surface. There are no visible fossils and no secondary calcite. The limestone is slightly arenaceous and is underlain by a red and grey siltstone. It strikes N 5° E and dips 21° SE.

The limestone appears to be only 3 m thick and is probably covered by at least 6 m of overburden. There is no indication as to areal extent, although the limestone can be traced along Little River for a distance of 91 m.

The surrounding area is mainly open farmland with some wooded patches along the River. Another very thin bank of limestone is found along Little River, 529 m upstream. It was not sampled because of its impurity and minor thickness.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-12-1	42.10%	7.08%	7.35%	28.90%	14.20%

BROOKFIELD (Br-13-1)

This occurrence is located on Little River, approximately 5 km southeast of the Village of Brookfield. This limestone outcrops in and on the southern side of the River, 623 m downstream from where Little River crosses the Brentwood-Forest Glen road. The limestone is 1169 m upstream from Br-12-1 (Fig. 2).

Description

The limestone is hard, grey to brown, slightly porous, Upper Windsor Group dolomitic limestone. Alternating bands of light brown and dark grey material make up the occurrence. The bedding is well developed with a light brown, rough, weathered surface. The limestone contains numerous, very small cavities running parallel to the banding. Some of these small cavities contain small blebs of purple fluorite. It strikes N 75° E and dips 16° SE.

There is little indication as to the thickness of the limestone, but it does not appear to be very thick. The overburden is at least 3-4.6 m thick. The surrounding area is mainly cultivated farm land and is easily accessible. This limestone is of very little economic value.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-13-1	40.50%	10.00%	9.95%	28.00%	11.50%

BROOKFIELD (Br-14-1)

This occurrence of limestone is on Little River, 67 m downstream from where Little River crosses the Brentwood-Forest Glen road. This area is approximately 5 km southeast of the Village of Brookfield. Limestone outcrops on the southern side of the River in a 12 m high embankment. The embankment consists of limestone from top to bottom. The outcrop area is 556 m upstream from Br-13-1. Limestone can be traced along the River for a distance of 61 m (Fig. 2).

Description

This is a grey, very hard, dense, massive, fossiliferous, B_1 Windsor Group limestone. The bedding is very poorly developed with a brown, rough, weathered surface. Numerous fossil cavities throughout give the limestone its rough, weathered surface. Bryozoans and brachiopods are the only fossils found. These fossils are not well preserved. Very little secondary calcite is found in the cavities. It appears to strike N 35° W and dip 30° NE.

The limestone is at least 15 m thick with no more than a few metres of overburden. The areal extent of the limestone is not known because of the lack of outcrop or float on top of this hill.

The surrounding area is mainly wooded, but a road servicing cultivated fields runs along the top of the occurrence making it easily accessible for drilling.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-14-1	43.00%	1.38%	0.50%	54.05%	0.60%

BROOKFIELD (Br-15-1)

This occurrence is found on Fields Brook. The area is approximately 4.8 km southeast of the Village of Brookfield. Float from this limestone can be found 6 m up the Brook north from the road which runs between Brentwood and Forest Glen. The float occurs as large boulders in and on the western side of Fields Brook (Fig. 2).

Description

The limestone is brownish-grey, hard, dense, massive, Windsor Group limestone. No outcrop is visible. The weathered surface is light brown and pitted. No fossils were found. A few cavities were found, some containing calcite.

There is no indication as to the areal extent or thickness of the limestone. Overburden is at least 3 m thick. The surrounding area is mainly open farm land and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-15-1	43.20%	3.67%	1.78%	49.40%	2.70%

BROOKFIELD (Br-16-1) (Br-16-2)

This occurrence is located on Fields Brook, 4 km southeast of the Village of Brookfield. Outcrops of this limestone are found 1524 m south along Fields Brook from where the logging road at Forest Glen crosses Fields Brook. The limestone outcrops in and on the western bank of Fields Brook, although most of the outcrop is in the Brook. Limestone outcropping can be traced along the Brook for a distance of 91 m. Boulders of the limestone are found in a 9 m high hill beside the Brook (Fig. 2).

Description

On the bottom of the section, the limestone is hard, thinly bedded, argillaceous and dark grey. This basal section then grades into a light grey, massive, hard, fossiliferous, high calcium limestone and then again into a thinly bedded, compact limestone. The bedding is generally well developed with a smooth, light grey, weathered surface. In the upper portion of this occurrence, a large amount of calcite is found filling fossil cavities. The fossils found in this occurrence include brachiopods, crinoid stems, corals (cup corals) and bryozoans (*Fenestrellina lyelli* and *Batostomella*(?)). This is not the massive type of limestone which is typical of the B Subzone. It is only a small biohermal development. It strikes N 56° E and dips approximately 30° SE.

There is no indication as to the thickness, although it is probably at least 6-9 m thick. Very little overburden is covering the limestone. The surrounding area is heavily wooded and not easily accessible. Sample Br-16-2 was taken from the 9 m cliff of fossiliferous limestone.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-16-1	38.15%	11.50%	2.40%	45.60%	2.20%
Br-16-2	43.70%	1.50%	0.70%	53.30%	0.78%

BROOKFIELD (Br-17-1)

This occurrence is located on Fields Brook, 1740 m downstream from the logging road which crosses Fields Brook at Forest Glen. This area is 4 km southeast of Brookfield. This occurrence is located 216 m downstream from Br-16-1. Outcrop can be found on the eastern bank of the Brook in a 3.7 m embankment and can be traced for a distance of 30 m (Fig. 2).

Description

The limestone is hard, dense, dark grey, compact, fossiliferous, Windsor Group limestone. The bedding is well developed with a light brown, smooth, weathered surface. Only a few brachiopods were found at this occurrence. Very little calcite was found in this limestone. It strikes N 41° E and dips 39° SE.

There is no indication of the thickness or areal extent of the limestone. The overburden is only light. The surrounding area is heavily wooded and not readily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-17-1	39.85%	7.55%	2.35%	47.50%	0.85%

BROOKFIELD (Br-18-1)

Occurrence Br-18-1 is located on Fields Brook, 4 km southeast of Brookfield. The limestone outcrops 1871 m downstream from where the logging road at Forest Glen crosses Fields Brook and 100 m downstream from Br-17-1. Outcrops are found in and on both banks of the Brook. Here the banks of the Brook are only 0.9-1.2 m high. This occurrence is probably a continuation of Br-17-1 (Fig. 2).

Description

The occurrence is a hard, dense, grey, fossiliferous, highly siliceous, Windsor Group limestone. The bedding is well developed with a light brown, crumbly, weathered surface. There are numerous fossil and solution cavities. Some of the cavities are lined with calcite crystals. The only fossils found were brachiopods. It strikes N 41° E and dips 30° SE.

The limestone does not appear to be very thick, although the total thickness cannot be seen. There appears to be very little overburden. The limestone is overlain by grey siltstone which outcrops 30 m down the Brook. The surrounding area is heavily wooded and not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-18-1	28.70%	32.10%	3.65%	33.50%	0.80%

BROOKFIELD (Br-19-1)

Outcrops of this occurrence of dolomite can be found on Fields Brook, 4 km southeast of Brookfield. The dolomite is located 79 m downstream from Br-18-1 and is underlain by a grey siltstone. This dolomite outcrops only in the Brook with some rubble found on the western bank. The dolomite strikes perpendicular to the Brook so that it cannot be traced for any distance (Fig. 2).

Description

The occurrence is dark brown, hard, massive, slightly porous, Windsor Group dolomite. The bedding is not well developed and it has a light brown, smooth, weathered surface. There were no fossils, calcite veins or stringers found. It strikes N 38° E and dips 30° SE.

The dolomite is approximately 4.5-6 m thick with only a small covering of overburden away from the Brook. The surrounding area is heavily wooded and not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-19-1	38.56%	17.45%	4.10%	24.40%	13.90%

BROOKFIELD (Br-20-1)

This occurrence is located on Fields Brook, 506 m downstream from Br-19-1 and 500 m upstream from the Brentwood-Forest Glen road. The limestone in this occurrence is found outcropping along the western bank of the Brook and is found in a mound which strikes perpendicular to the Brook. This mound is 6 m high (Fig. 2).

Description

The occurrence is grey, hard, massive, fossiliferous, B_1 Subzone Windsor Group limestone. The bedding is very poorly developed with a light grey, rough, weathered surface. Numerous fossil cavities can be seen, some partially filled with calcite crystals. Fossils include abundant bryozoans and brachiopods.

The mound trends N 70° E, but there is no indication as to the dip or the strike of the limestone. This mound is 3 m wide on top and the limestone is probably at least 4.5-6 m thick with no overburden. The surrounding area is only lightly wooded, but is not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-20-1	44.30%	0.30%	0.60%	54.20%	0.81%

BROOKFIELD (Br-21-1)

This occurrence of limestone is found outcropping on the western side of Highway 102 (Truro-Halifax Highway), approximately 396 m south of the Brookfield turnoff. The limestone outcrops on the western side of the Highway and was uncovered during excavation for this Highway. Outcroppings of this limestone can be found 15 m up a small brook which crosses the Highway at this point (Fig. 2).

Description

The occurrence is bluish-grey, brittle, slightly fossiliferous, Windsor Group limestone. It is a well bedded and platy limestone. Crinoid stems and small shell fragments are abundant. Brachiopods are common, but are not in identifiable condition. This appears to be Upper Windsor Group limestone, possibly Subzone D or E. Calcite stringers are abundant with some of the crystals being larger than what are normally found in limestones. Large calcite veins are also prominent. The limestone strikes N 40° W and dips 10° SW.

The thickness of the limestone could not be seen. The overburden is only slight.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Br-21-1	36.30%	13.50%	3.55%	45.10%	0.87%

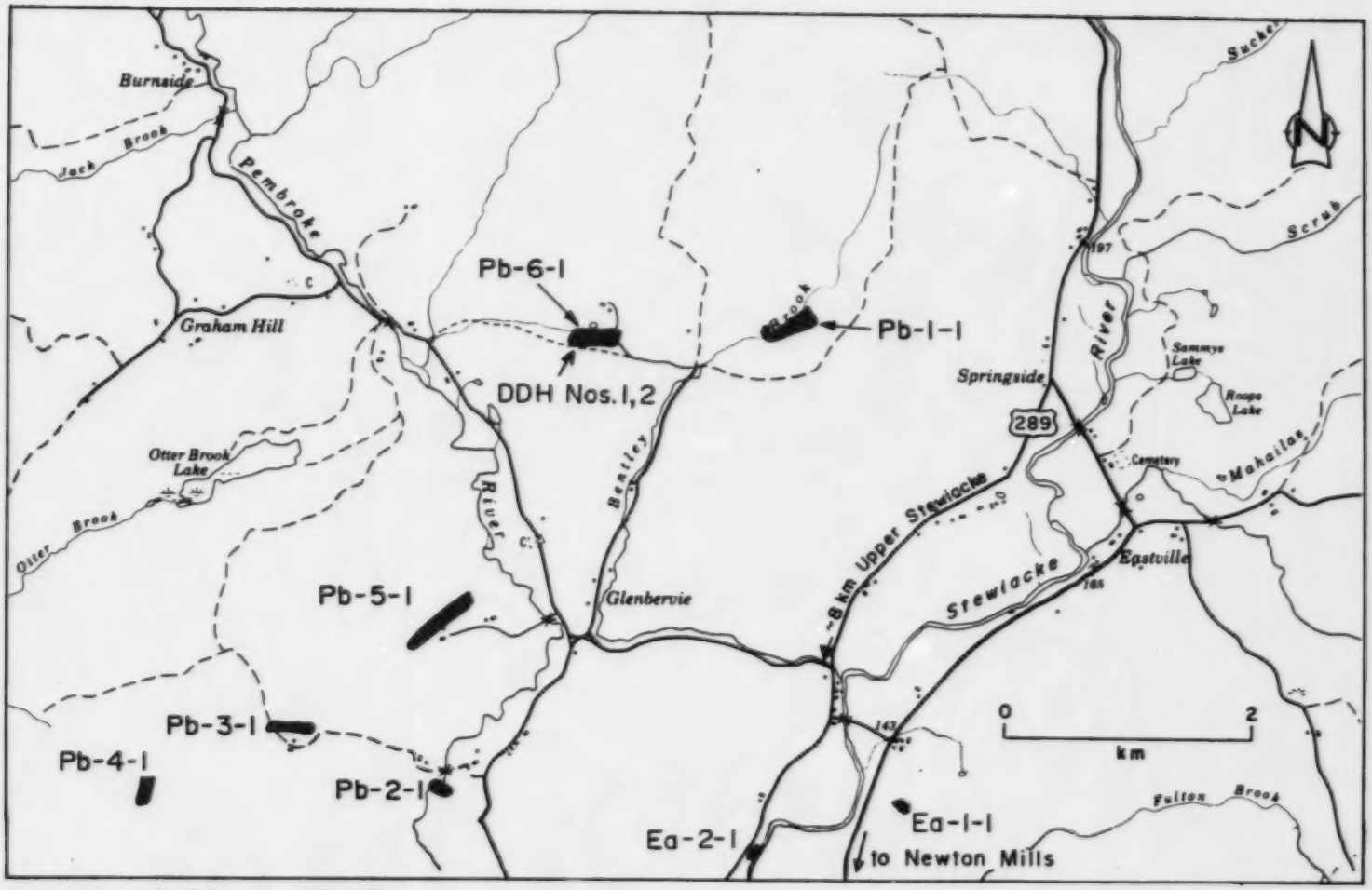
EASTVILLE AREA

EASTVILLE (Ea-1-1)

This limestone occurrence is located 3.5 km southwest of Eastville on the eastern side of the road running between Newton Mills and Eastville. The limestone outcrops in a mound which is 283.5 m east of the road and 0.6 km south of the interval road which joins the Newton Mills-Eastville road with Route 289. The mound is trending in a N 30° W direction and can be traced for a distance of 1067 m. The mound is only 18.3-21.3 m wide at the summit and reaches a height of approximately 9 m above the surrounding terrain (Fig. 11).

Description

The occurrence is a grey, hard, massive, highly fossiliferous, high calcium, Windsor Group limestone belonging to the B_1 Subzone (Bell, 1929). The bedding is very poorly developed with a rough, light brown, weathered surface. The fossils found are brachiopods, bryozoans and worm burrows. The



Ref. Map 11E/02 and 11E/07

Figure 11. Location map of limestone and dolomite occurrences sampled in the Eastville and Pembroke River areas, Colchester County (11E/02 and 11E/07).

limestone is composed almost entirely of fossils and fossil cavities. To the east, 183 m, the limestone is associated with gypsum which is found in an old quarry with walls reaching 18.3-21.3 m in height. There are numerous sink holes over the entire area.

There was a limestone quarry indicated on Fletcher and Faribault (1902) at this location.

There is no indication of the dip, strike, thickness or areal extent of this limestone because of the lack of outcrop. The limestone is found mainly as rubble along the edges of the mound. The limestone has a reef like structure with the limestone sloping off on both sides, away from the crest of the mound. The overburden appears to be only slight. The surrounding area is heavily wooded and is not easily accessible, although it is not far from the main road.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Ea-1-1	42.50%	0.23%	0.55%	55.05%	0.59%

EASTVILLE (Ea-2-1)

This occurrence of dolomite is located southwest of Eastville and northeast of Upper Stewiacke along Route 289. The dolomite outcrops along the western side of the Stewiacke River, approximately 1.6 km south of the road which joins the Newton Mills-Eastville road with Route 289. These outcrops can be traced for 30 m along and on the bottom of the Stewiacke River. They are located behind a log cabin which is built on the bank of the River (Fig. 11).

Description

The occurrence is brown, porous, crumbly, massive, very fossiliferous, B Subzone Windsor Group dolomite. The bedding is very poorly developed with a rough, dark brown, weathered surface. The fossils include bryozoans (stick), brachiopods and crinoid stems. The fossils are well preserved with some of the internal structure showing in some of the fossil cavities. Some of the cavities are filled or partially filled with calcite. This is a very pure dolomite. This dolomite is in the vicinity of Ea-1-1 which is found about 1.3 km northeast and is very similar to Ea-1-1 except that Ea-1-1 is limestone.

There is a definite stratification striking N 60° W and dipping 43° NE, although it does not appear to be the bedding. The stratification is probably due to weathering. There is no indication as to the thickness or areal extent. The glacial till appears to be very thick away from the River, with at least 4.6-6 m of overburden. The surrounding area is only lightly wooded and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Ea-2-1	46.60%	0.64%	1.04%	32.75%	19.05%

GREEN CREEK AREA

GREEN CREEK (GC-1-1)

This occurrence of impure limestone is located at Green Creek, on the eastern shore of the Shubenacadie River approximately 11 km from the mouth of the River. The limestone here is almost vertical and forms a point which juts out into the River. This point is known as Anthonys Nose. This location is approximately 0.8 km south of the Green Creek-Old Barns road. The limestone forms a 23-30 m cliff (Fig. 12).

Description

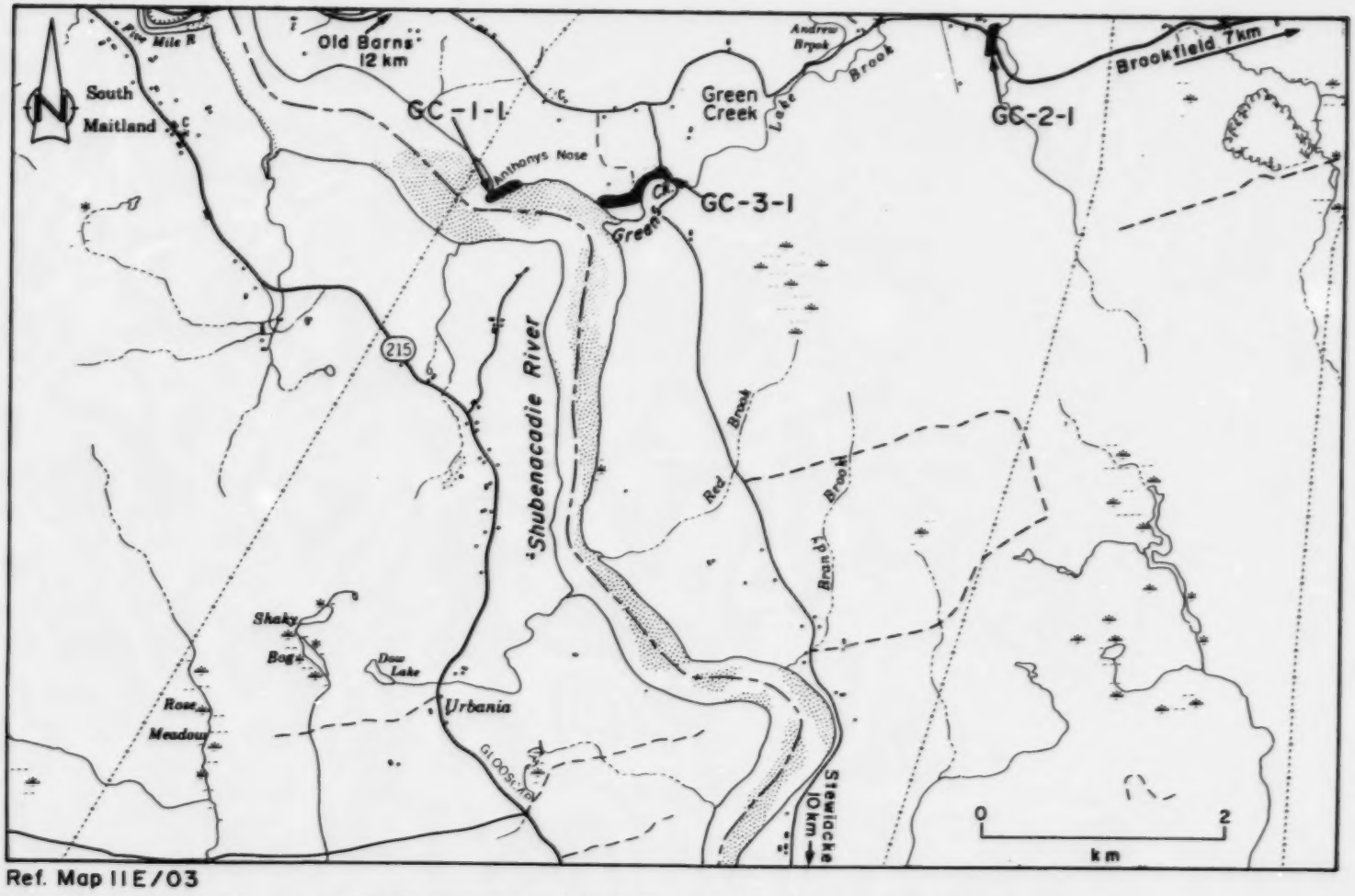
This limestone ranges in colour from light brown to dark grey to light grey, is hard, dense, siliceous, fossiliferous, algal and belongs to the Windsor Group. The bedding is well developed with a light brown to grey, smooth, weathered surface. The limestone is thinly bedded and very fossiliferous on the bottom and changes to an algal limestone on top of the section. This algal limestone is also fossiliferous. The algal material resembles large pillow structure with small oncolitic mounds comprising these larger mounds Figs. 13 and 14). The fossils consist of several varieties of brachiopods and a few pelecypods. The limestone is underlain by gypsum and red and grey siltstone and is overlain by red and grey siltstone. It strikes N 65° E and dips 80° SE.

The limestone is 9-12 m thick with very little overburden. Along strike, the limestone can be traced for a distance of 91 m. The surrounding area on top of the cliff and away from the River is only lightly wooded and is easily accessible.

There are several very thin beds of limestone east of Anthonys Nose along the shore (Fig. 15). These beds are interbedded with siltstones and shales and are of no value. Some of the beds have been folded extensively near a fault, approximately 0.4-0.8 km east of Anthonys Nose and no more limestone can be seen.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GC-1-1	35.65%	14.60%	3.82%	44.10%	0.75%



Ref. Map 11E/03

Figure 12. Location map of limestone and dolomite occurrences sampled in the Green Creek area, Colchester County (11E/03).

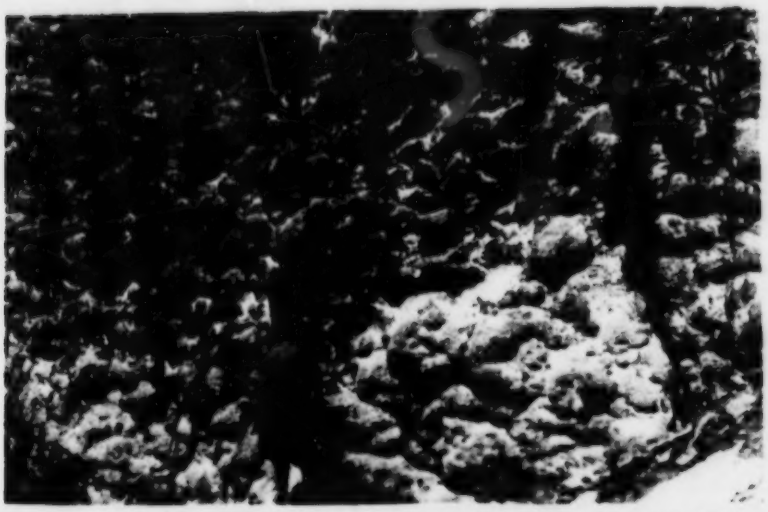


Figure 13. Vertical dipping beds of Upper Windsor limestone showing a nodular, bedding surface. This outcrop is at Anthonys Nose, Colchester County (GC-1-1).

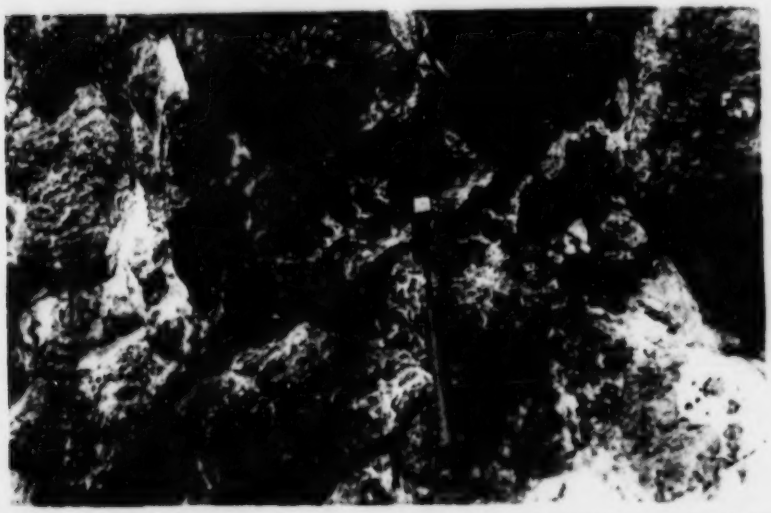


Figure 14. Closeup of limestone in Figure 13 showing nodular nature, Anthonys Nose, Colchester County (GC-1-1).

Figure 15. Thin bed of folded Upper Windsor limestone found along the shore of the Shubenacadie River, just east of Anthonys Nose, Colchester County (GC-1-1).

GREEN CREEK (GC-2-1)

This occurrence is located east of Green Creek which is several kilometres west of the Village of Brookfield. The limestone outcrops along the southern side of the Brookfield-Green Creek road, 4 km east of the Stewiacke turnoff. The limestone outcrops on the property of Sanford Burris in a 1.8 m embankment along the side of the road. This mound of limestone trends across the road and runs in a northerly direction (Fig. 12).

Description

This occurrence is dark grey, hard, dense, fossiliferous, Upper Windsor Group limestone. The limestone ranges from thickly bedded (10-13 cm) to thinly bedded (<2.5 cm) and these beds alternate. The bedding is very well developed with a dark grey, smooth, weathered surface. The fossils found are brachiopods, gastropods, a few small trilobites, and some long, tapering cylindrical fossils. Numerous, calcite veins ranging up to 10 cm in thickness can be seen throughout. There is no indication as to the dip and strike because the outcrop area is small, shows slumping and has been extensively broken.

There is no indication as to the thickness of the limestone. The overburden appears to be only slight. The limestone can be traced in a narrow mound in a northerly direction for a distance of 0.4 km where it crosses the Green Creek-Brookfield road and extends into a field on the northern side. The surrounding area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GC-2-1	36.50%	12.80%	4.03%	45.20%	0.87%

GREEN CREEK (GC-3-1)

This occurrence can be found at Green Creek on the eastern side of the Shubenacadie River. The limestone outcrops on both sides of the road running from Stewiacke to Green Creek and can be found 45.7 m north of the bridge which crosses Greens Creek (Fig. 12) as well as along the Creek.

Description

The occurrence is a brownish-grey, hard, slightly porous, fossiliferous, highly siliceous, argillaceous, limestone, probably belonging to the Upper Windsor Group C Subzone. The upper 0.6 m of the limestone is light brown, hard, massive and highly calcareous containing numerous cavities. The bedding is very well developed, ranging in thickness from 0.6-2.5 cm. The weathered surface is dark brown and smooth. The fossils found include brachiopods and crinoid stems. There are numerous rounded, long tapering objects(?) which show no structure or orientation. There are numerous worm trails on the bedding surfaces of most of the limestone. There are numerous 0.6 cm thick, clayey and carbonaceous layers along most of the bedding surfaces. It strike N 70° E and dips 10° NW (Figs. 16 and 17). This is a channel sample.

The limestone ranges from 7.6-10.6 m thick and can be found in a 15 m embankment along the northern side of Greens Creek. The overburden appears to range from 3-4.5 m thick. The limestone is underlain by a red and grey siltstone and is overlain by a thinly bedded, red siltstone. This limestone can be traced along Greens Creek from the bridge to the mouth of Greens Creek where it empties into the Shubenacadie River. Away from the Creek, the land is hilly and heavily wooded but is accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GC-3-1	25.50%	35.01%	7.30%	29.70%	1.17%

HILDEN AREA

HILDEN (Hi-1-1) (Hi-1-2) (DIAMOND DRILLING)

The occurrence is located 4.3 km west of Hilden which is located on Route 2 south of Truro. The dolomite can be found outcropping in a quarry 27.4 m west of the road running from Hilden to Irwins Lake. This road at one time ran through to Lower Truro. This quarry can be found 1.2 km northwest

Figure 16. Flat lying Windsor limestone found along Greens Creek, Colchester County (GC-3-1).

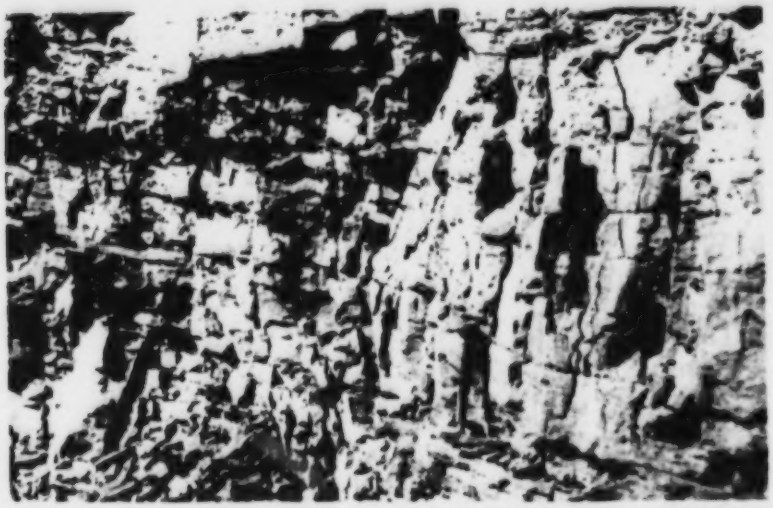


Figure 17. Closeup of Figure 16 showing the nearly flat lying limestone along Greens Creek, Colchester County (GC-3-1).

of the Hilden-Pleasant Valley turnoff along this road. The dolomite outcrops in a mound which can be traced for approximately 152.4 m on both sides of and in the road (Fig. 5).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Hilden area.

Description

The dolomite displays many colours from light grey to red, is hard, dense, massive, very fossiliferous, and belongs to the Windsor Group in the B_1 Subzone (Bell, 1929). The bedding is very poorly developed with a light brown, rough, weathered surface. The dolomite is stained red in a number of places and also contains some small, rounded (octahedral), hematite(?) crystals. The fossils found include several varieties of brachiopods, a few cephalopods, crinoid stems and bryozoans. The crinoid stems have been replaced by black dolomite. Near the top of the section, the dolomite becomes very white and hard and also contains some fossils. The strike and dip could not be measured because of the massive nature of the dolomite. The mound is, however, trending N 35° E.

The dolomite can be found outcropping on both sides of the mound. This mound drops off 9.1-10.6 m on both sides at its highest point. The crest of the mound is very narrow. There is no indication as to the areal extent of the dolomite. The thickness is at least 6-7.6 m with very little overburden. The area is easily accessible, although heavily wooded.

Sample Hi-1-1 was taken from the lower section and Hi-1-2 was taken from the white dolomite in the upper section.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Hi-1-1	46.55%	0.58%	1.90%	30.40%	20.45%
Hi-1-2	43.40%	1.35%	2.27%	34.85%	18.35%

LONDONDERRY AREA

LONDONDERRY (Ld-1-1)

This occurrence of limestone is located 0.8 km northeast of Lornevale and 5 km west of Londonderry. The limestone outcrops in a quarry 88 m south of a road which runs west from the falls on Spencer Brook. The marble can be found 731 m west of the intersection of the Spencer Brook road and the road which runs west. Several iron quarries can be found in the area. The turnoff is 0.48 km north of the Lornevale-Londonderry road. Goudge (1934) indicated that the limestone had been quarried from several locations in the area, but only one quarry was located (Figs. 18 and 19).

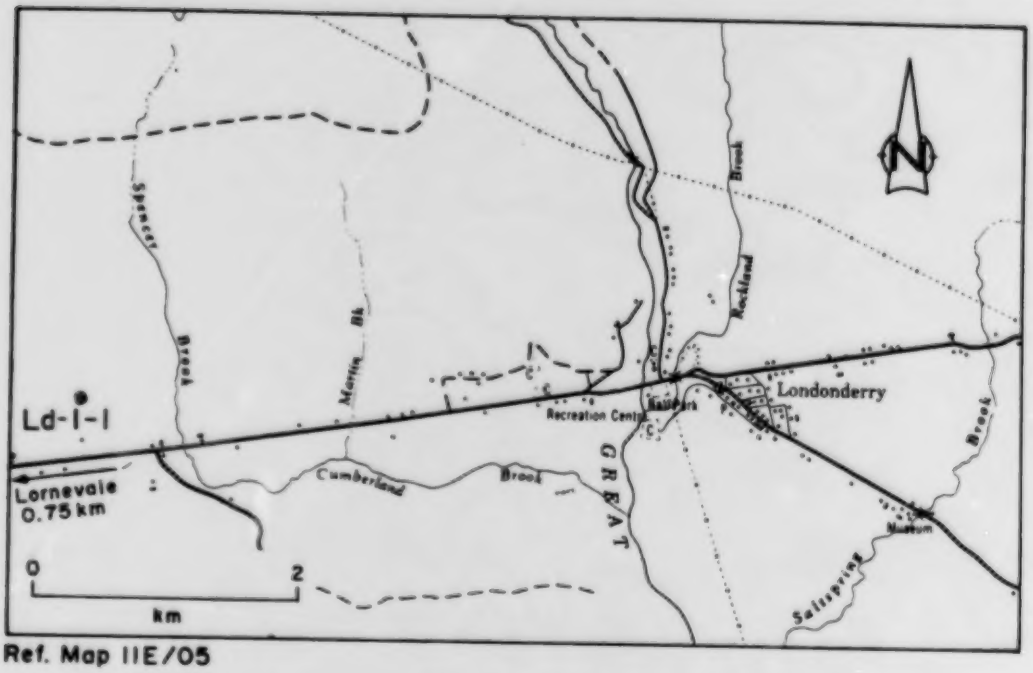


Figure 18. Location map of limestone occurrence sampled in the Londonderry area, Colchester County (11E/05).

Description

The occurrence is white, tan, grey, hard, dense, finely crystalline, metamorphosed limestone found in the Cobequid Fault Zone (Fig. 20). It is similar in appearance to the George River limestones found on Cape Breton Island. The bedding is indistinguishable with a dark grey, rough, weathered surface. There is no indication as to the thickness or areal extent of the limestone. The limestone is thought to cover a wide area. The quarry is now partially filled with water. The surrounding area is only lightly wooded and is easily accessible.

This limestone was used at one time as a flux in the iron works at Londonderry.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Ld-1-1	43.10%	1.18%	0.45%	53.99%	0.98%

Figure 19. Quarry of metamorphosed limestone found in the Cobequid Mountains, 5 km west of the Village of Londonderry, Colchester County (Ld-1-1).

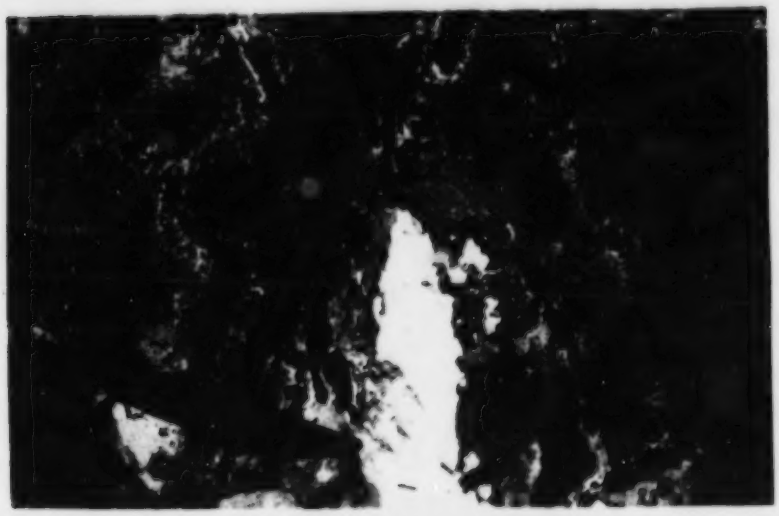


Figure 20. Closeup of white marble found in the quarry shown in Figure 19, west of Londonderry, Colchester County (Ld-1-1).

LOWER FIVE ISLANDS AREA

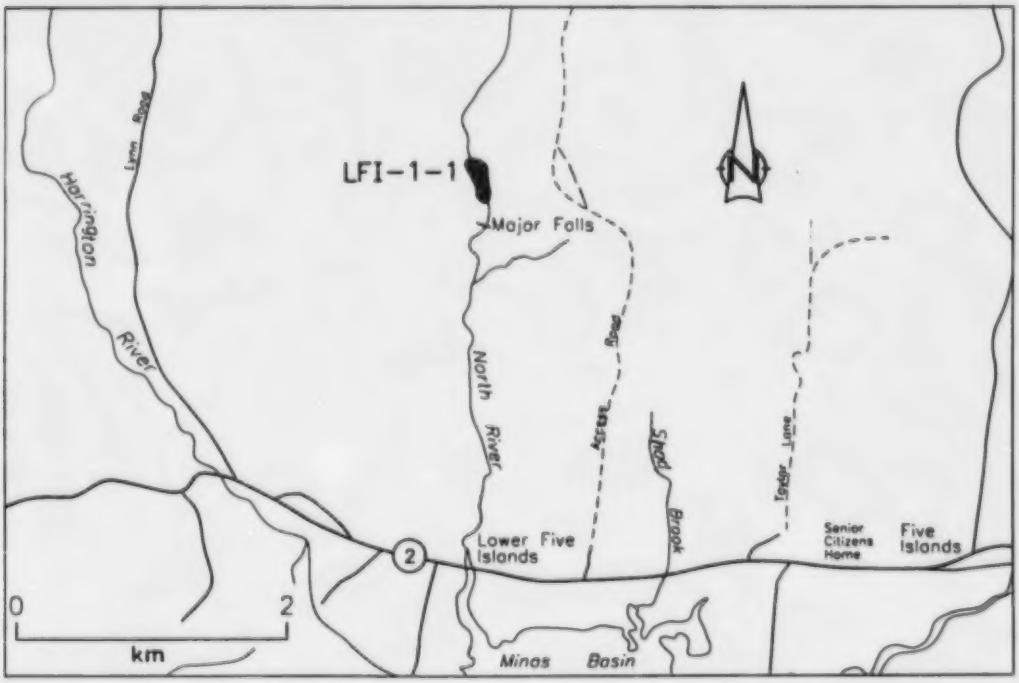
LOWER FIVE ISLANDS (LFI-1-1)

The occurrence is located on the North River approximately 3 km north of where it intersects Route 2 (Fig. 21). The North River empties into the Minas Basin at Lower Five Islands at its intersection with Route 2. The occurrence is approximately 0.5 km north of the major falls.

Description

The occurrence is grey, white marble and calcareous metasiltstone of the Hadynian Jeffers Formation (Donohoe and Wallace, 1982). It occurs within variably deformed volcanic and volcaniclastic rocks of the Jeffers Formation. Bedding and low grade metamorphic foliation trend southeastward and dip to the southwest. A southeastward trending foliation antiform runs through the area (Donohoe and Wallace, 1982).

The marble occurs on the western side of a deeply incised river valley. Boulders of marble are found in the stream and on the western bank. The surrounding area is not easily accessible.



Ref. Map 21H/08

Figure 21. Location map of limestone occurrence sampled in the Lower Five Islands area, Colchester County (21H/08).

Analysis

Sample	SiO_2	Al_2O_3	CaO	MgO	Fe_2O_3	Brightness
LFI-1-1	1.76%	0.14%	54.34%	0.23%	0.034%	92.3%

MANGANESE MINES AREA

MANGANESE MINES (MM-1-1)

This occurrence is located at Manganese Mines, 11 km east of the Town of Truro and 0.6 km north of the Trans-Canada Highway 104. The limestone can be found outcropping in a small quarry 165 m east of the road which runs from Route 4 at Half Moon Hill to Route 4 again at East Mountain. This limestone outcrops in an open field just west of the Clifford Brook. The quarry is marked on the 1:50 000 topographic map of the area (Fig. 22).

This deposit was further explored by Lafarge Canada Inc. in the late 1980s. A geophysical survey further delineated the deposit and a followup diamond drilling program of 14 holes outlined a mineable deposit of 146 000 t to 5 m and 292 000 t to 10 m depth (Levaque *et al.*, 1988). Lafarge Canada Inc. undertook mining on this deposit in the 1990s.

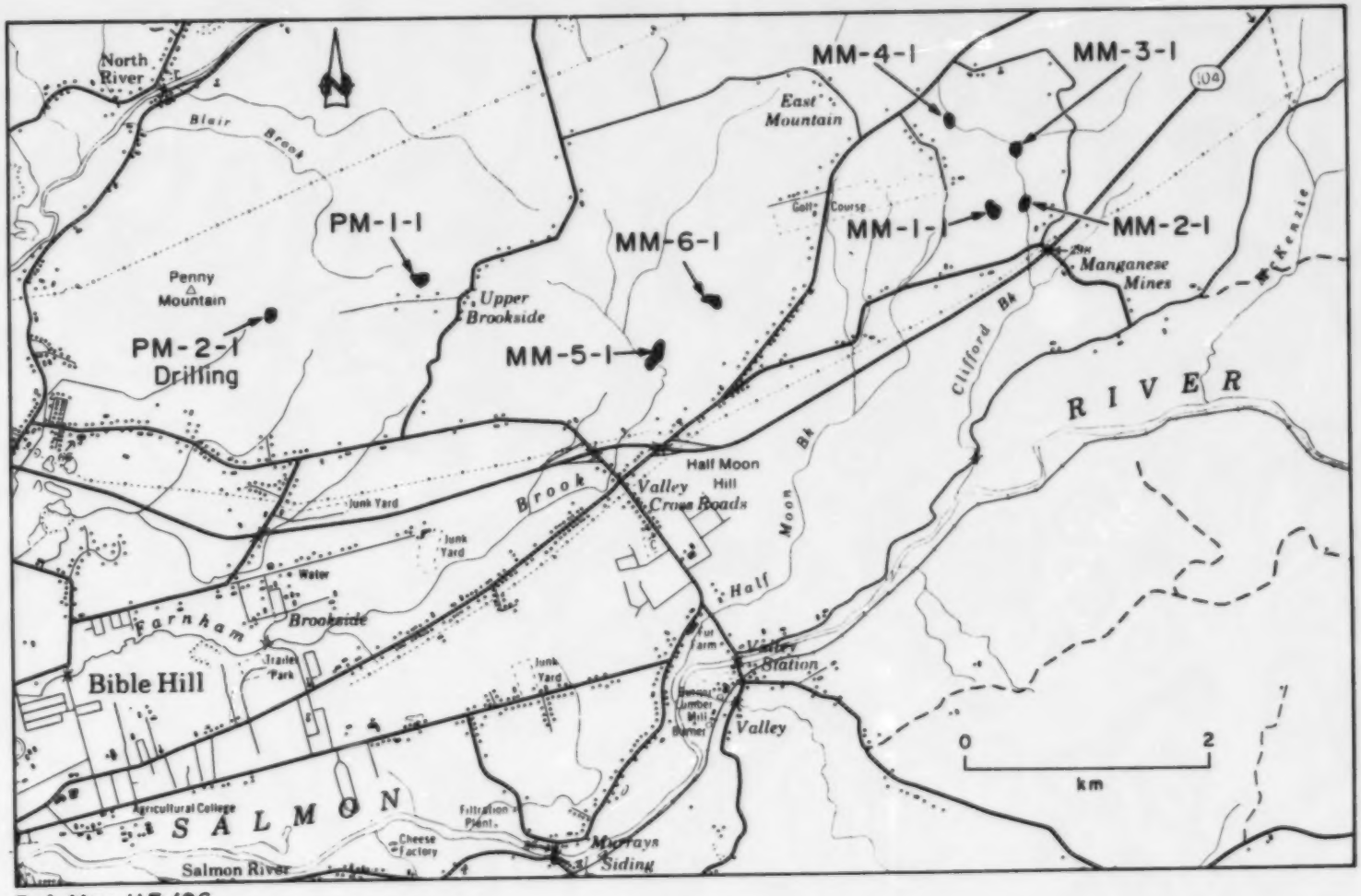
Description

The occurrence is light grey, very hard, dense, medium grained, massive, slightly metamorphosed, Windsor Group limestone. The bedding is very poorly developed with a light brown, weathered surface. It appears to strike N 66° E and dip 65° NW; but, due to the small areal extent of the outcrop and the massive nature of the limestone, the dip and strike are difficult to determine. There is no indication as to the thickness of the limestone. There appears to be very little overburden.

The surrounding area is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MM-1-1	42.00%	2.80%	1.00%	52.99%	0.30%



Ref. Map 11E/06

Figure 22. Location map of limestone and dolomite occurrences sampled in the Manganese Mines and Penny Mountain areas, Colchester County (11E/06).

MANGANESE MINES (MM-2-1)

This occurrence of limestone is located at Manganese Mines, 527.3 m up Clifford Brook from Trans-Canada Highway 104. Manganese Mines is 11 km east of Truro. The limestone outcrops in the Brook and in a 9 m high embankment which hangs over the Brook. It outcrops on both sides of and in the Brook (Fig. 22).

Description

The occurrence is light, reddish-grey, hard, dense, massive, medium grained, slightly metamorphosed, Windsor Group limestone. This is thought to be a Pembroke Formation limestone (Stevenson, 1958) which is a limestone conglomerate overlying the laminated limestone which is the lowermost limestone in the Windsor Group (Fig. 23). The bedding is very poorly developed and highly fractured with a reddish-brown, rough, weathered surface. There are red seams of hematitic material along with calcite filled cavities and seams of calcite crystals. Towards the bottom, the limestone becomes conglomeratic. It appears to be striking N 35° W and dipping 44° SW on the western side of Clifford Brook; but, on the eastern side of the Brook, the limestone occurs in a mound and appears to strike N 68° E and dip 53° SE.

The limestone is at least 12 m thick with very little overburden. The surrounding area is wooded, but is easily accessible.

Figure 23. Outcrop of Pembroke Formation limestone found outcropping on Clifford Brook at Manganese Mines, Colchester County, 11 km east of Truro (MM-2-1).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MM-2-1	41.00%	4.50%	1.32%	52.20%	0.30%

MANGANESE MINES (MM-3-1)

This occurrence is located at Manganese Mines, 11 km east of Truro. The limestone outcrops on the northern side of a small brook which runs into Clifford Brook and is found at the junction of the two brooks. This occurrence is located 387 m up Clifford Brook from MM-2-1 and 914 m up Clifford Brook from the road which runs between Route 4 and Manganese Mines. The limestone outcrops in a 4.6 m high hill (Fig. 22).

Description

The occurrence is reddish-grey, hard, massive, dense, medium grained, in part conglomeratic, Pembroke Formation, Windsor Group limestone (Stevenson, 1959). It contains a large amount of red silty staining throughout. The bedding is very poorly developed with a rough, reddish-brown, weathered surface. The dip and strike could not be measured because of the small areal extent of the outcrop.

There is very little overburden. Thickness could not be determined. The surrounding area is hilly, only lightly wooded and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MM-3-1	38.85%	8.55%	2.58%	48.75%	0.37%

MANGANESE MINES (MM-4-1)

This occurrence of limestone is located at East Mountain, 11 km east of Truro and 1.6 km northwest of Manganese Mines. The limestone can be found outcropping in an old quarry which is located 106.7 m south of Route 4 behind the house of V. R. MacCulloch on Clifford Brook. The walls of the quarry reach a height of 10.7 m in places. The quarry is found 4.2 km northeast of the Half Moon Hill intersection along Route 4 (Fig. 22).

Description

This is a grey, hard, dense, massive, medium- to coarse-grained, Windsor Group limestone, probably belonging to the B Subzone (Bell, 1929). The bedding is indistinguishable (Figs. 24 and 25). The weathered surface is light grey and rough. Numerous fractures can be seen throughout. The calcite veins are numerous and range up to 10 cm in thickness. The limestone is very cavernous. It appears to be striking N 10° W and dipping 53° NE(?). In other sections it appears to be flat lying.

The limestone is at least 12 m thick with very little overburden. The surrounding area is open and easily accessible for drilling which would be required for further information.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MM-4-1	43.00%	1.28%	1.26%	53.90%	0.88%

MANGANESE MINES (MM-5-1)

This occurrence of impure limestone is located southwest of Manganese Mines which is 11 km east of Truro. The limestone outcrops in Farnham Brook and on both sides in small embankments. The outcrop can be found 823 m upstream from Trans-Canada Highway 104 at Half Moon Hill. A logging road runs beside the Brook. The limestone forms a 6 m embankment on the northern side of the Brook (Fig. 22).

Description

This is a dark grey to black, hard, dense, medium grained, argillaceous, siliceous, laminated, Windsor Group limestone belonging to the A Subzone (Bell, 1929) (Figs. 26 and 27). The bedding is very well developed with a light grey, smooth, weathered surface. The limestone contains many minor folds and crenulations in the bedding. There are small veins and stringers of white calcite throughout the outcrop area. Some slippage is seen along the bedding planes with a few small spatterings of pyrite. The limestone also contains a few fossils which appear to be pelecypods. It contains a few thin arenaceous layers throughout. It strikes N 13° W and dips 20° NE. This is a channel sample.

The limestone is at least 7.6-9 m thick with no more than a few metres of overburden covering the rock. The area is only lightly wooded and is easily accessible.

Figure 24. Small quarry of massive, B Subzone, Windsor Group limestone located northwest of Manganese Mines, Colchester County (MM-4-1).

Figure 25. Closeup of Figure 24 showing the massive nature of the limestone northwest of Manganese Mines, Colchester County (MM-4-1).

Figure 26. Laminated, basal Windsor Group limestone found near Manganese Mines, Colchester County (MM-5-1).

Figure 27. Closeup of laminated, basal Windsor Group limestone shown in Figure 26, near Manganese Mines, Colchester County (MM-5-1).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MM-5-1	28.10%	33.10%	5.87%	28.60%	2.40%

MANGANESE MINES (MM-6-1)

This occurrence is located 3.2 km west of Manganese Mines and 8 km northeast of the Town of Truro. The limestone is found outcropping in the side of the hill on an old farm road which runs to the top of the hill. It is northwest of Route 4. The limestone can only be found outcropping on the farm road (Fig. 22).

Description

The occurrence is light grey, hard, dense, slightly metamorphosed, slightly conglomeratic, Windsor Group limestone, with a red staining. This limestone is similar to that found at occurrence MM-2-1 which is called the Pembroke Formation (Stevenson, 1958). The bedding is massive and very poorly developed with a light brown, nodular, weathered surface. Small clusters of calcite crystals can be found throughout. The strike and dip could not be measured due to the massive nature and limited extent of the limestone.

There appears to be very little overburden, but there is no indication as to the thickness of the limestone. The surrounding area is only lightly wooded, mainly with evergreens, and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MM-6-1	43.05%	1.46%	0.40%	54.90%	0.35%

PEMBROKE RIVER AREA

PEMBROKE RIVER (Pb-1-1)

This occurrence is located on a small brook which flows southwestward, south of the farm of Elwood Graham. This area is located 2.7 km northeast of the Glenbervie crossroads. The limestone begins to show in the brook 644.7 m upstream from the Pembroke road and can be traced as rubble along

the brook for a distance of 393 m. The limestone outcrops very little, but appears to run in 9-12 m high banks along the side of the brook (Fig. 11).

Description

The occurrence is light brownish-grey, hard, porous, medium grained, slightly fossiliferous, massive, Windsor Group limestone. The bedding is very poorly developed with a light brown, rough, weathered surface. Numerous empty cavities (shell cavities?) can be seen throughout. There is no indication as to the dip and strike because of the massive nature and limited areal extent of the limestone. The ridge in which the limestone is found is trending N 65° E.

The overburden is only slight, but there is no indication as to the thickness of the limestone. The area is heavily wooded and is not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Pb-1-1	42.65%	1.47%	1.77%	53.85%	0.61%

PEMBROKE RIVER (Pb-2-1)

This occurrence of highly siliceous limestone is located southwest of Glenbervie in the Upper Stewiacke Valley. This limestone is found on the Pembroke River, 159.4 m downstream from the bridge which crosses a farm road which is located 1.4 km south of Glenbervie. The road crosses the River 0.6 km west of the Glenbervie-Upper Stewiacke road. This farm road runs to the Johnson farm and ends at this farm. The limestone outcrops in and on both sides of the Pembroke River (Fig. 11).

Description

The occurrence is mainly a light grey, hard, dense, siliceous, slightly fossiliferous, dolomitic, Windsor Group limestone (Fig. 28). The bedding is well developed and blocky with a light brown, smooth, weathered surface. The limestone varies a great deal from top to bottom. On the bottom, the limestone is oncolitic and laminated in spots. The lower part also contains some pyrite and chalcopyrite associated with the laminated section plus numerous cavities partially filled with calcite. Nearer the top, the limestone becomes dense, more dolomitic and slightly fossiliferous, containing a few brachiopods. It strikes N 15° W and dips 11° NE. The limestone is underlain by a green and red siltstone which grades upward into the limestone.

The limestone does not appear to be greater than 6 m thick with 6-7.6 m of overburden. The surrounding area is mainly open and accessible.

Figure 28. Outcrop of siliceous, dolomitic Windsor Group limestone found along the Pembroke River, near Upper Stewiacke, Colchester County (Pb-2-1).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Pb-2-1	31.10%	26.80%	7.70%	21.30%	12.10%

PEMBROKE RIVER (Pb-3-1)

This occurrence is located 2.6 km southwest of the Glenbervie intersection and 1.4 km west of Pb-2-1 and 2 km west of the Glenbervie-Upper Stewiacke road. The limestone can be found outcropping in several locations on the property of Paul Johnson. The limestone outcrops in Mr. Johnson's cellar, behind the house, and in a small brook to the west of the house (Fig. 11).

Description

The occurrence is light brownish-grey, hard, dense, medium grained, oolitic, siliceous, Windsor Group limestone. The bedding is very well developed and the limestone was at one time used for flagstone. The weathered surface is light brown and smooth. The limestone is composed almost entirely of oolites. It is flat lying and can be found over the whole area surrounding the Johnson farm.

There is no indication as to the thickness of the limestone. The overburden is very slight, no more than 1.5-3 m in depth. The surrounding area is easily accessible and is mainly open fields.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Pb-3-1	34.10%	19.80%	2.08%	42.80%	0.40%

PEMBROKE RIVER (Pb-4-1)

This occurrence is located approximately 4 km southwest of Glenbervie. The limestone outcrops on a brook which crosses an old logging road which runs west from the Johnson farm (see Pb-3-1). The brook crosses this road 1.2 km west of the Johnson farm. The limestone can be found 0.4 km down the brook from the road. The limestone outcrops on the eastern side of this small brook at the base of an 18-21 m embankment (Fig. 11).

Description

The occurrence is dark grey, hard, slightly porous, argillaceous, siliceous, medium grained, Windsor Group limestone. The bedding is well developed with a grey, smooth, weathered surface. It is striking N 50° E and is dipping vertically.

There was no indication as to the thickness of the limestone because of the small outcrop area. The overburden is only slight.

There was a lime quarry in the area, worked during the late 19th Century and early 20th Century, but the area has grown in, and the quarry could not be found. The area is heavily wooded and very inaccessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Pb-4-1	31.70%	22.30%	5.83%	38.70%	0.84%

PEMBROKE RIVER (Pb-5-1)

This occurrence is located on the property of Donald Graham at Glenbervie. This area can be found 1 km west of the Glenbervie-Burnside road at the end of the farm road which runs west 0.3 km

northwest of the intersection at Glenbervie off the Burnside road. The limestone can be found outcropping the full length of the hill, 30.5 m behind the Donald Graham farmhouse. The limestone can be traced from the saw mill, N 40° E onto the property of Walter Graham. The limestone was quarried at one time, but only to a small extent (Fig. 11).

Description

The occurrence is light brown, very hard, dense, medium grained, oolitic, highly siliceous, Windsor Group limestone (Fig. 29). The bedding is well developed with a dark brown, smooth, weathered surface. The rounded grains of silica can be seen with the naked eye. The limestone is oolitic at the top of the section, but becomes more fossiliferous towards the bottom of the section. Brachiopods are the main fossil type. It strikes N 40° E and dips 24° SE.

The limestone is at least 9 m thick with very little overburden. The limestone outcrops all along the southern side of the hill. The area is easily accessible, but the limestone is very siliceous.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Pb-5-1	26.70%	37.10%	1.68%	32.70%	0.91%

PEMBROKE RIVER (Pb-6-1) (DIAMOND DRILLING)

This occurrence is located 2.25 km north of the Village of Glenbervie. The limestone can be found outcropping 45.7 m north of an abandoned road which runs from Eastville to Graham Hill, north of Glenbervie. This outcropping is south of the farm house of Boyd Hamilton on the southern side of a small brook which runs into the Pembroke River. The area is 487.7 m west of the Boyd Hamilton farm road. The area surrounding the limestone is open where trenching has been carried out. An adit has also been put into the limestone for galena which is found associated with the limestone. Drilling was carried out on this area by Dome Exploration Company in 1960-1961 (Dome Exploration Company (Canada) Ltd., 1960) (Fig. 11).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Pembroke River area.

Description

The occurrence is dark grey, hard, dense, massive, highly fossiliferous, Windsor Group limestone belonging to the B Subzone (Bell, 1929) (Fig. 30). The bedding is very poorly developed and highly fractured. The weathered surface is light brown and rough showing the fossils which stand up on

Figure 29. Siliceous limestone found west of Glenbervie, Colchester County (Pb-5-1).

Figure 30. Highly fractured, fossiliferous limestone found north of Glenbervie, Colchester County (Pb-6-1).

this surface. Numerous stringers of calcite can be seen throughout. The fossils in this occurrence are very numerous and well preserved and include brachiopods, pelecypods, gastropods, cephalopods and bryozoans. No particular orientation of the fossils was noticed. Some sections of the limestone are very fossiliferous although other sections show very few fossils and are very compact. The galena is found as stringers and pods throughout, partially replacing some of the fossils. The galena is very abundant throughout the outcrop area. It appears to be striking N 56° E and dipping almost vertically. This, however, may be due to fracturing and not to bedding.

If the above is bedding, then the limestone appears to be between 30.5 m and 42.7 m thick with very little overburden in the vicinity of the trenching.

The area is lightly wooded and is easily accessible. There is no indication as to the areal extent because outcrop away from the trenching is very sparse.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Pb-6-1	42.45%	2.50%	1.07%	53.60%	0.35%

PENNY MOUNTAIN AREA

PENNY MOUNTAIN (PM-1-1)

This occurrence of siliceous limestone is located at Penny Mountain which is approximately 7 km northeast of Truro. The outcrop can be found in an old farmhouse foundation at Upper Brookside (Fig. 31). This area is 0.32 km west of the Upper Brookside road. There is very little outcrop showing in the area, but there is a great deal of rubble (Fig. 22).

Description

The occurrence is dark grey, hard, brittle, laminated, fossiliferous, argillaceous, highly siliceous, Windsor Group limestone (Fig. 32). The bedding is very well developed with a light grey, smooth, weathered surface. The bedding ranges from 0.6-5 cm. A few calcite veins can be seen cutting the limestone. The fossils found were brachiopods. The strike and dip could not be determined due to the lack of outcrop area.

There is no indication as to the thickness of the limestone. The overburden is at least 3 m thick. The surrounding area is open fields and is easily accessible.

Figure 31. Limestone can be seen outcropping at the base of an old foundation at Penny Mountain, Colchester County (PM-1-1).

Figure 32. Rubbly nature of the limestone shown in Figure 31, Penny Mountain, Colchester County (PM-1-1).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
PM-1-1	26.75%	32.80%	8.64%	29.80%	0.80%

PENNY MOUNTAIN (PM-2-1) (DIAMOND DRILLING)

This limestone occurrence can be found on Penny Mountain, located approximately 6 km northeast of Truro. The outcrop area is on the northern side of Penny Mountain in an open field. This area is 1310.6 m west of PM-1-1 and 1713 m west of the Upper Brookside-Brookside road. Numerous small pits have been dug all over the top of the hill with small areas of outcrop in these pits (Fig. 22).

Description

The occurrence is light reddish-grey, hard, dense, medium grained, massive, Windsor Group limestone, probably belonging to the Pembroke Formation (Stevenson, 1958), which is Lower Windsor Group (Fig. 33). The limestone appears to have been slightly metamorphosed. The bedding is indistinguishable with a light grey, nodular, weathered surface. Some slickensiding can be seen. The outcrop has a red iron staining throughout. The limestone bed is trending N 70° W and appears to be dipping 70°-80° S.

Lafarge Canada Inc. drilled 17 drillholes on this occurrence during 1984 and 1985. A conservative estimate of reserves derived from this program suggested the existence of approximately 500 000 t of high-calcium limestone with a content of 50% CaO at this location. See Appendix 1 for detailed analyses of 78 m of drill core (Lafrenière and Clark, 1986).

The drilling program by Lafarge (Lafrenière and Clark, 1986) intersected limestone at a depth of 76 m below the surface in some drillholes. The entire side of the hill appears to be underlain by the limestone. There is very little overburden. The surrounding area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
PM-2-1	43.40%	0.52%	0.53%	54.80%	0.41%

Figure 33. Lower Windsor Group limestone found at Penny Mountain, Colchester County (PM-2-1).

PRINCEPORT AREA

PRINCEPORT (Pt-1-1)

This occurrence is located along the eastern shore of the Shubenacadie River, 1 km northwest of Princeport (Fig. 34). The limestone is found on the shore of the River below the high tide level and outcrops in a mound trending N 28° W into the River. It cannot be found outcropping above the high tide level. The mound averages approximately 9 m across at the top (Fig. 5).

Description

The occurrence is dark grey, very hard, massive, slightly fossiliferous, Windsor Group limestone. The limestone varies in colour from yellowish brown to reddish brown. There are numerous small cavities throughout the limestone. The bedding is very poorly developed with a dark grey to black, pitted, weathered surface. The few fossils found are brachiopods. The strike and dip could not be obtained because of the massive nature of the limestone.

The thickness or areal extent of the occurrence could not be determined. The overburden away from the Shubenacadie River appears to be very extensive. The bank of the River at this point is 12-15 m high.

Figure 34. Limestone outcropping below high tide level on the Shubenacadie River near Princeport, Colchester County (Pt-1-1).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Pt-1-1	43.60%	1.20%	2.03%	49.45%	4.50%

SMITHFIELD AREA

SMITHFIELD (Sf-1-1)

Smithfield is located approximately 7 km northeast of Middle Stewiacke. The limestone outcrops in a quarry 610 m west from where the Chapman Brook crosses the Middle Stewiacke-Greenfield road. The quarry is 45.7 m north of an abandoned farm and road which at one time joined up with the Middle Stewiacke-Camden road. The road is now impassable and is completely grown in at various locations (Fig. 35).

Description

The occurrence is a dark grey, hard, laminated, argillaceous, medium grained, Windsor Group limestone belonging to the A Subzone (Bell, 1929). The bedding is very well developed with a light

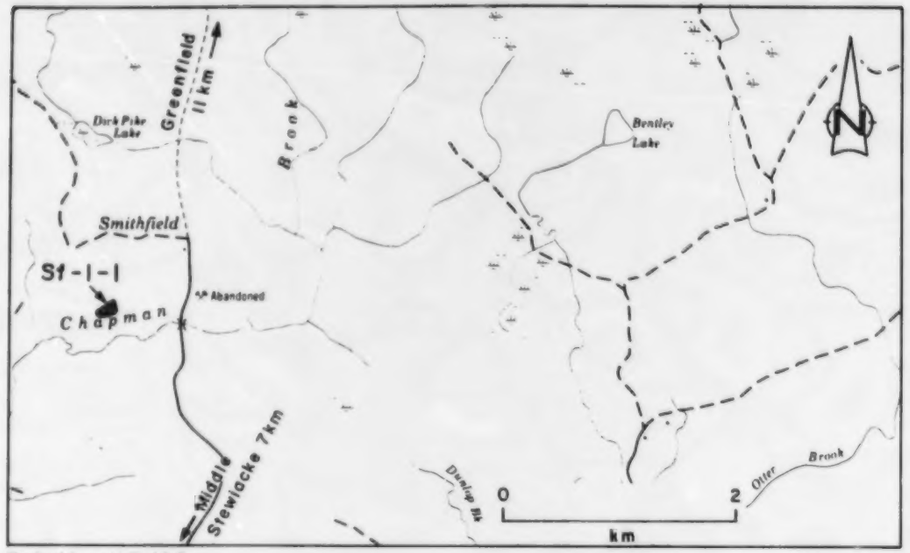


Figure 35. Location map of limestone occurrence sampled in the Smithfield area, Colchester County (11E/06).

grey, mainly smooth, weathered surface (Figs. 36 and 37). A few clusters of small calcite crystals can be seen in the rock. It strikes N 63° E and dips 35° SE.

The limestone outcrops in an old quarry which has a 3-4.6 m face. This limestone can be traced along for several hundred metres west of the quarry, but very little outcrop can be found except in the quarry. The limestone is at least 4.6 m thick with little overburden. The surrounding area is mainly open fields and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Sf-1-1	40.15%	5.30%	2.80%	50.40%	0.54%

Figure 36. Small quarry of basal Windsor limestone located at Smithfield, Colchester County (Sf-1-1).

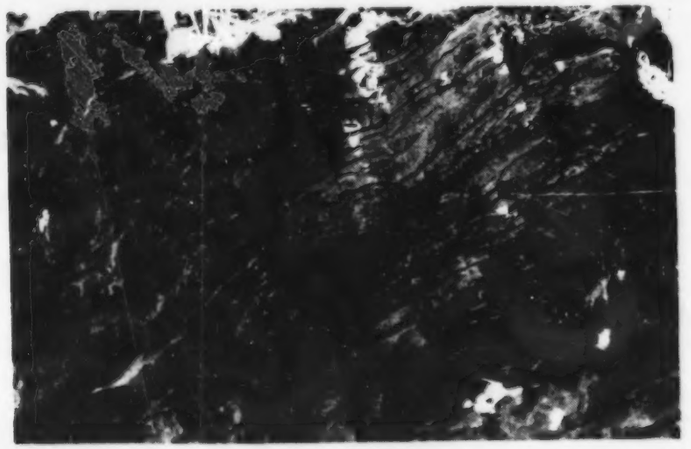


Figure 37. Closeup of the limestone at Smithfield, Colchester County, showing the laminated nature of the basal limestone (Sf-1-1).

STEWIACKE AREA

STEWIACKE (Sw-1-1)

This occurrence is located outcropping along the St. Andrews River. This dolomite can be found along the northern side of the River where the River comes closest to the Stewiacke-Lanesville road, 1 km east of the Stewiacke turnoff on the West St. Andrews-Alton road. This occurrence is 152.4 m east of a saw mill. The dolomite outcrops at the base of a 4.6 m bank and in small amounts in the River. The outcrop area is very small. Stevenson (1959) considered this area to be in the Pennsylvanian (Riversdale Group) (Fig. 38).

Description

The occurrence is hard, dense, fine grained, Windsor Group dolomite (Fig. 39). The bedding is not well developed and is thickly bedded ranging up to 20-25 cm in thickness. The weathered surface is light brown and smooth. Some surfaces contain calcite. It also contains a few small cavities. The strike and dip could not be measured because of the small areal extent.

There is no indication as to the thickness of the dolomite. The overburden is approximately 4.6-6 m. The surrounding area is only lightly wooded and is easily accessible.

Analysis

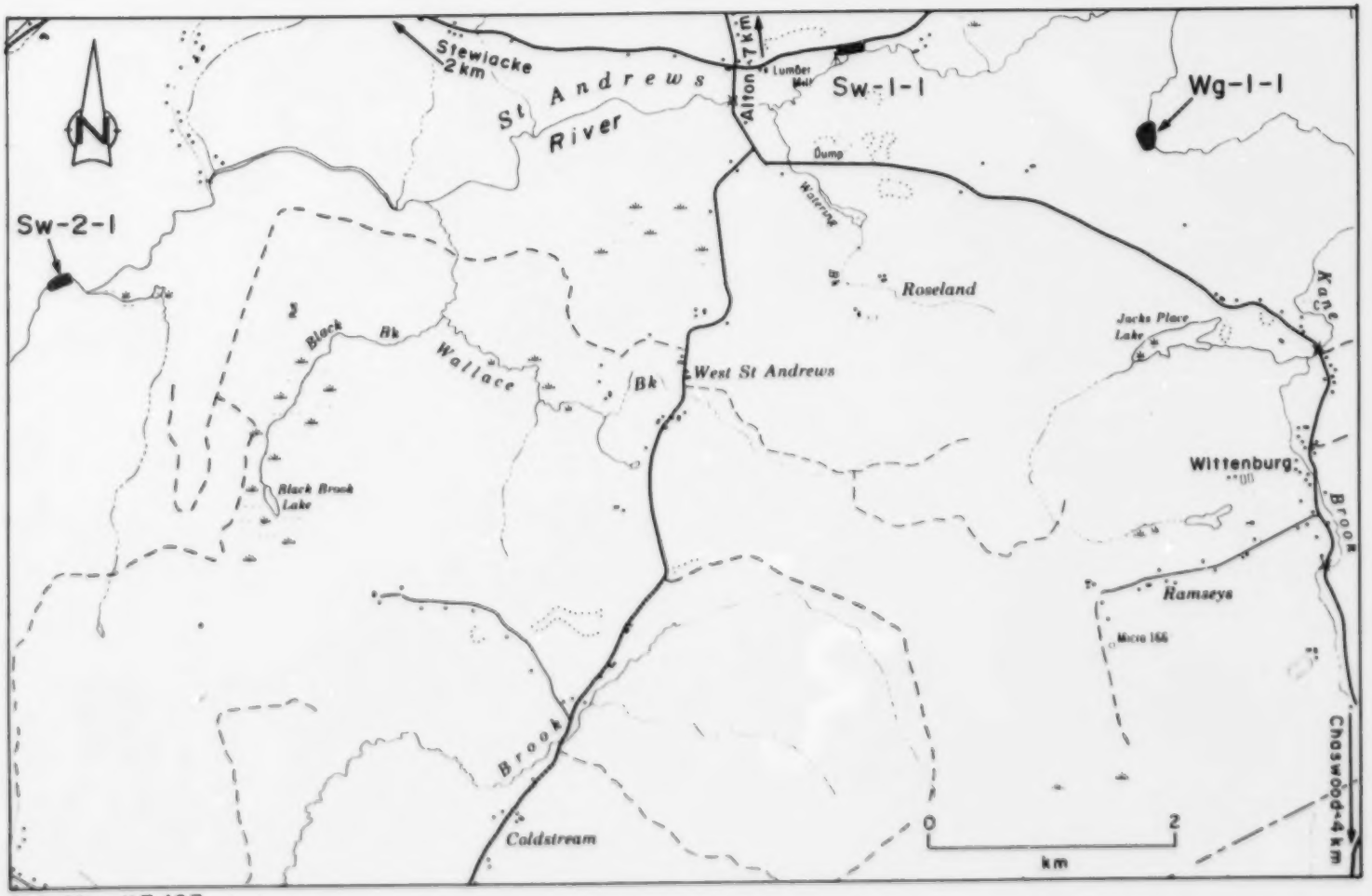
Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Sw-1-1	42.25%	7.85%	5.40%	27.90%	16.20%

STEWIACKE (Sw-2-1)

This occurrence is located on the St. Andrews River, approximately 3 km southwest of the Town of Stewiacke. This area can be reached by driving south on St. Andrews Street in Stewiacke and driving to the end of the road. The dolomitic limestone outcrops in the River, 897 m downstream from where the road ends. The outcrop covers only a small area. The limestone can be traced as float for 183-213 m down the River (Fig. 38).

Description

The occurrence is grey, very hard, dense, massive, fine grained, siliceous, dolomitic, Windsor Group limestone. The bedding is very poorly developed with very little bedding shown. The weathered



Ref. Map 11E/03

Figure 38. Location map of limestone and dolomite occurrences sampled in the Stewiacke and Wittenburg areas, Colchester County (11E/03).

Figure 39. Thickly bedded dolomite found on the St. Andrews River, east of Stewiacke, Colchester County (Sw-1-1).

surface is light brown and mainly smooth except where it has been pitted by the River. Black clayey seams can be seen throughout. There is no indication as to the dip and strike due mainly to the massive nature and small areal extent of the outcrop.

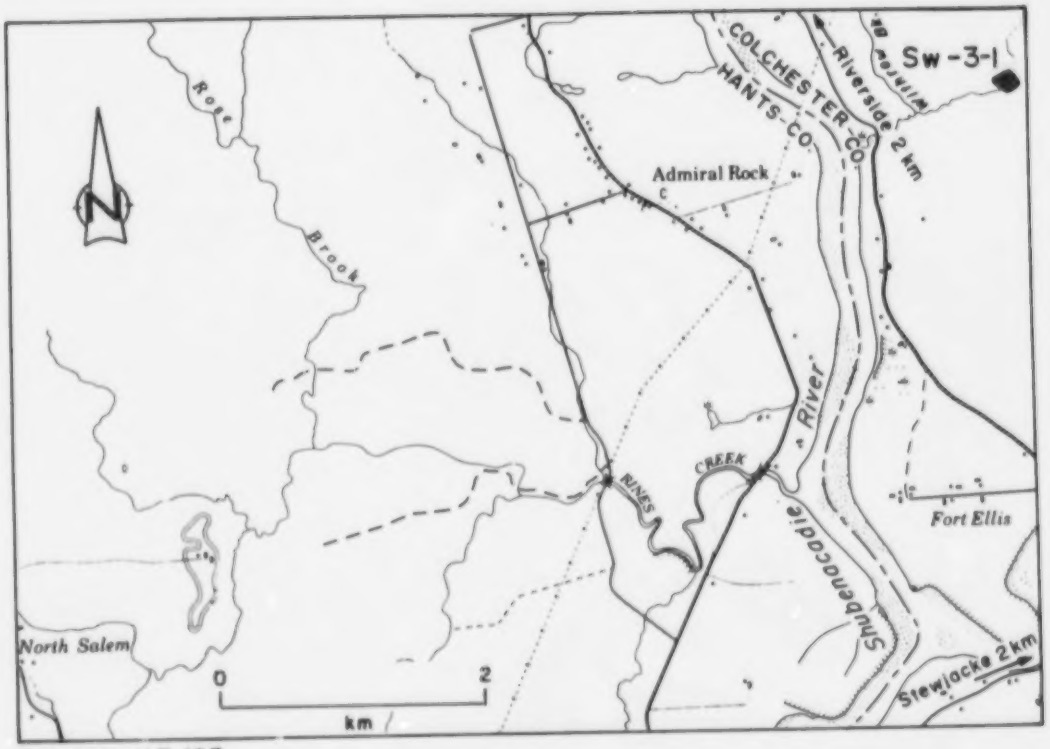
There is no indication as to the thickness of the limestone. The overburden is not great near the River, but it becomes progressively thicker away from the River. The surrounding area is heavily wooded and is not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Sw-2-1	32.85%	25.10%	5.78%	22.00%	13.85%

STEWIACKE (Sw-3-1)

This occurrence is located 4.8 km northwest of the Town of Stewiacke. The limestone outcrops on the southeastern branch of Withrow Brook which runs westward into the Shubenacadie River north of Fort Ellis. The upper end of the limestone is located 507 m up the southeastern branch of Withrow Brook from where it joins the northern branch and is 925 m east of the Stewiacke-Riverside road which runs along the Shubenacadie River (Fig. 40).



Ref. Map 11E/03

Figure 40. Location map of limestone occurrence sampled in the Stewiacke area, Colchester County (11E/03).

Description

The occurrence is brown, soft, slightly porous, siliceous, argillaceous, massive, dolomitic, Windsor Group limestone. The bedding is very poorly developed with a soft, brown, smooth, weathered surface. At the upper end of the limestone, the strike is N 25° W and the dip is 10° NE. Nearer the bottom of the section the limestone strikes east and dips 11° N. The limestone outcrops only in Withrow Brook and in the bank of the Brook and can be traced along this Brook for a distance of 192 m.

There is no indication as to the thickness or areal extent. The overburden appears to be 3-4.6 m thick. The surrounding area is heavily wooded and is not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Sw-3-1	40.65%	10.06%	4.42%	33.40%	11.50%

UPPER ECONOMY AREA

UPPER ECONOMY (Ec-1-1)

This occurrence is located 2 km north of Upper Economy on the road running from Upper Economy to Pleasant Hills. The limestone can be found outcropping in the ditch on the western side of the road, in the small brook which runs adjacent to the road, and also in a small quarry which is 128 m due west of the road, behind an old foundation. The limestone also outcrops on the road (Fig. 41).

Description

The occurrence is dark grey, hard, dense, medium grained, fossiliferous, Windsor Group limestone (Fig. 42). The bedding is well developed with a light brown, smooth, weathered surface. A few thin calcite veins are present. The fossils found are brachiopods (Fig. 43). The individual bedding layers range up to 5 cm in thickness. The limestone in the old quarry is lighter in colour, more porous and slightly more dolomitic than that found in the brook and on the road. It strikes generally N 20° E and dips 44° NW. Towards the bottom of the section, the limestone swings around and strikes N 60° W and dips almost vertically towards the northeast.

There is no indication as to the thickness, however the limestone can be traced along the ditch, across strike, for a distance of 103.6 m. The overburden appears to be slight. The surrounding area is open fields and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Ec-1-1	40.50%	5.67%	3.32%	40.50%	8.90%

WITTENBURG AREA

WITTENBURG (Wg-1-1)

This occurrence is located approximately 2.4 km northwest of Wittenburg which is on the Chaswood-Alton road. The limestone outcrops in the St. Andrews River and can be reached by an old road which runs north from the Wittenburg-Alton road. The outcrop is 1 km up this road, where it reaches the River. The limestone can be traced along the River for 183 m, striking almost perpendicular to the flow of the River. It is 5.8 km southeast of the Stewiacke turnoff from the Chaswood-Alton Road (Fig. 38).

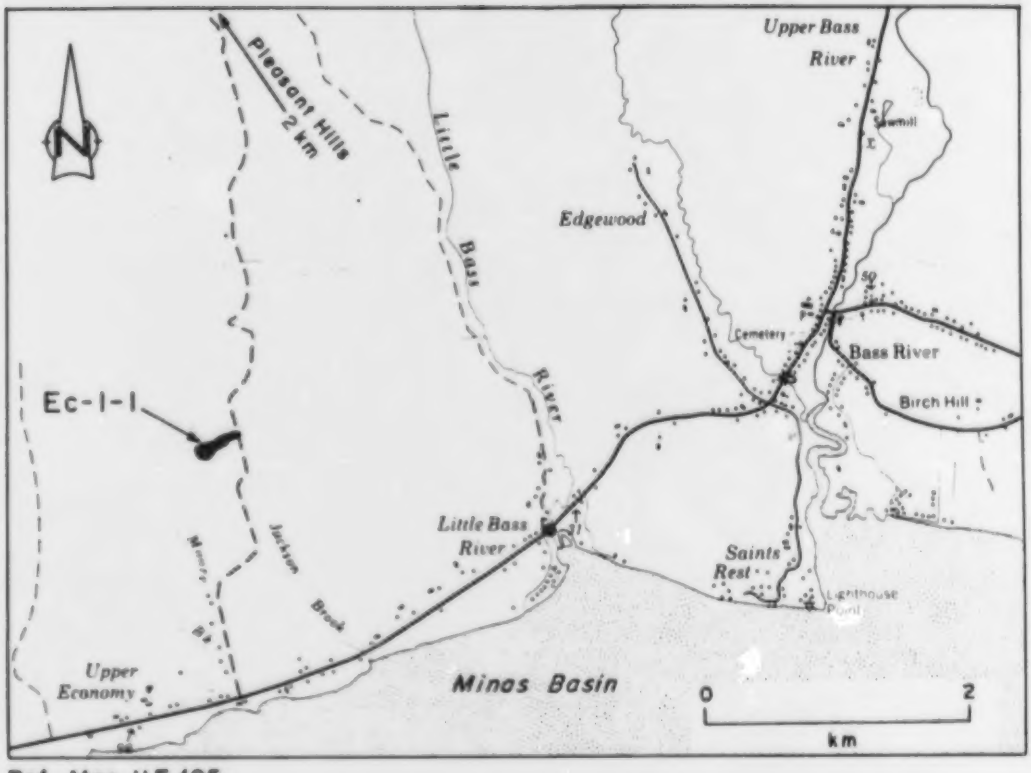


Figure 41. Location map of limestone occurrence sampled in the Upper Economy area, Colchester County (11E/05).

Description

This occurrence varies from light brown, soft, slightly porous, argillaceous, medium grained dolomite to a grey, hard, dense, medium grained dolomite to a grey, hard, dense, medium grained, dolomitic Windsor Group limestone. The bedding is not well developed and has a light brown, smooth, weathered surface. The dolomite is found at the bottom and changes into limestone at the top of the section. The limestone strikes N 54° E and dips only slightly towards the southeast.

The limestone outcrops entirely in the St. Andrews River and is covered by approximately 3-4.6 m of overburden on either side of the River. There is no indication as to the thickness of the limestone. The surrounding area is heavily wooded, but the area is easily accessible by the old road.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Wg-1-1	38.15%	12.60%	5.12%	36.70%	6.85%

Figure 42. Small quarry of limestone found on the western side of the Pleasant Hills-Upper Economy road, Colchester County (Ec-1-1).

Figure 43. Brachiopods found in the limestone shown in Figure 42, north of Upper Economy, Colchester County (Ec-1-1).

CHAPTER 3. HALIFAX COUNTY

GENERAL GEOLOGY

The limestone and dolomite in Halifax County are found in the Windsor Group marine sedimentary rocks. Except for a few small areas around St. Margarets Bay, the Windsor Group sedimentary rocks in the County are found in the Musquodoboit Valley. These Windsor Group sedimentary rocks are flanked to the north and south by Ordovician metamorphic rocks of the Meguma Group and are lapping on the Meguma slates and quartzites.

In the central and northern areas of the Windsor Group sections, very little outcrop is found except in small embankments in the Meguma Group. In the central and northern areas, the recent Pleistocene and Cretaceous sediments (till, clay and silica sand) form a thick cover over the Windsor Group, with some places in the centre of the Valley reaching a thickness of approximately 90-120 m.

Most of the outcrops of the Windsor Group in the Musquodoboit Valley are found along the southern contact of the Windsor Group and underlying Meguma Group. For the most part, the B Subzone is in direct contact with the Meguma. A few locations, however, show a thick conglomerate (Dollar Lake) underlying the B Subzone dolomite. The following is the usual stratigraphic sequence encountered in the Musquodoboit Valley:

Pleistocene	Sand and gravel till	
Cretaceous	Clay and silica sand	
Carboniferous (Windsor Group)	Upper Windsor	shales, siltstones, thin beds of limestone and dolomite
	Lower Windsor	shale, gypsum, dolomite, conglomerate (local)
Cambrian-Ordovician (Meguma Group)	Halifax Formation	slate
	Goldenville Formation	quartzite

Of all the samples taken in this area, 78% are either dolomite or dolomitic limestone. The dolomitic portions appear to be concentrated along the contact with the underlying Meguma Group. Towards the central part of the basin, the Upper Windsor Group rocks appear to have a higher limestone to dolomite ratio. The E Subzone can be found in several areas in the central part of the basin. It is characterized by corals and large brachiopods (Gigantoproductus). Most areas where it is found, E Subzone appears to have an upper section of fossiliferous limestone underlain by a soft, brown, porous dolomite.

The Meaghers Grant area varies a great deal from the Windsor sequence found in the Musquodoboit Valley. In Meaghers Grant the B Subzone dolomite is underlain by Meguma Group rocks, but appears to be overlain by a calcareous sandstone. The sandstone contains crossbedding and a large amount of mica. This sequence is found at several locations in the vicinity of Meaghers Grant.

At Upper Musquodoboit, the dolomite has been quarried extensively for agricultural use by Mosher Limestone Company Limited.

DOLLAR LAKE AREA

DOLLAR LAKE (DL-1-1) (DIAMOND DRILLING)

This occurrence is located on Dollar Lake Brook which is found 7 km southwest of the Village of Elderbank. This dolomite can be found outcropping on the road running from Meaghers Grant to Wyses Corner and can be found south of this road on either side of the Dollar Lake Brook covering a wide area. The main area is, however, east of the Brook. The dolomite can be traced east along the road for 405.4 m. The dolomite is not found outcropping north of the road and is not found on the western side of the Brook until 457 m south of the bridge over Dollar Lake Brook (Fig. 44).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Dollar Lake area.

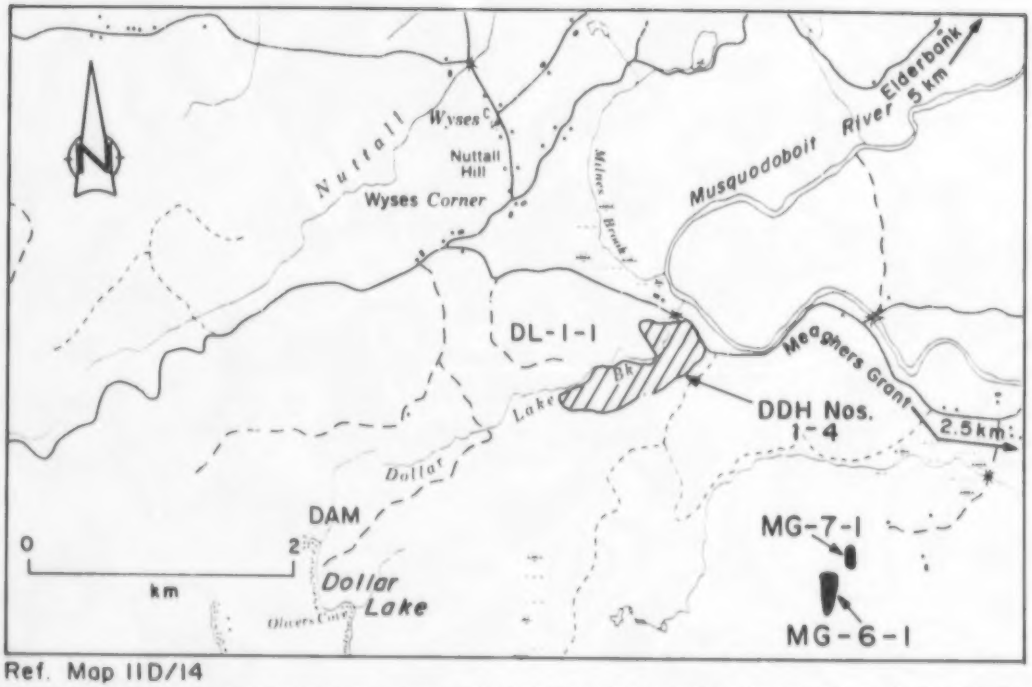
Description

The occurrence is brown, very hard, slightly fossiliferous, B Subzone, Windsor Group dolomite. The bedding is well developed and thickly bedded, ranging up to 0.6 m in thickness. The weathered surface is light brown, smooth and pitted with what appears to be numerous fossil cavities. No identifiable fossils could be found. The dolomite appears to have been slightly compressed. The dolomite is almost flat lying, and may be dipping slightly towards the northeast.

The dolomite can be traced up Dollar Lake Brook for about 610 m where it is underlain conformably by a conglomerate containing slate fragments from the Halifax Formation in a dolomite matrix. This is a basal Windsor Group conglomerate. The slate clasts vary in size up to very large blocks. The conglomerate is underlain by Meguma Group slate which is unconformable with the dolomite and conglomerate. The slate is striking in a northerly direction and dipping almost vertically towards the west.

The dolomite can be traced up the Brook beyond the dam for a distance of almost 1.6 km. This occurs only on the eastern side of the Brook. The dolomite seems to form a thin covering over the slate with no intervening conglomerate here. There are several minor faults running through the dolomite.

The dolomite appears to be at least 15 m thick. There are 9 m cliffs of dolomite along the Brook with very little overburden. The thickest section appears to be along the eastern side of the Brook with the dolomite thinning out very rapidly to the east and west. The dolomite appears to be either faulted off at the Meaghers Grant-Wyses Corner road or cut off by the Musquodoboit River which appears to have cut a wide channel through this area. The area is wooded, but easily accessible by old woods roads which traverse the area.



Ref. Map 11D/14

Figure 44. Location map of dolomite occurrences sampled in the Dollar Lake and Meaghers Grant areas, Halifax County (11D/14).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
DL-1-1	45.45%	1.80%	3.82%	31.70%	17.95%

ELDERBANK AREA

ELDERBANK (Eb1-1)

This occurrence is located approximately 1.6 km east of Elderbank on the Elderbank-Murchyville road, 0.24 km east of the Canadian National Railway track. The dolomite outcrops on the southern side of the road in a small 1.8 m high mound. The mound extends back from the road for a distance of 18-21 m. There is very little dolomite outcropping over the area because of the swampy terrain (Figs. 45 and 46).

Description

The occurrence is light grey, very hard, laminated, siliceous, Windsor Group dolomite. The bedding is well developed with a light brown, fairly smooth, weathered surface. This rock is much harder

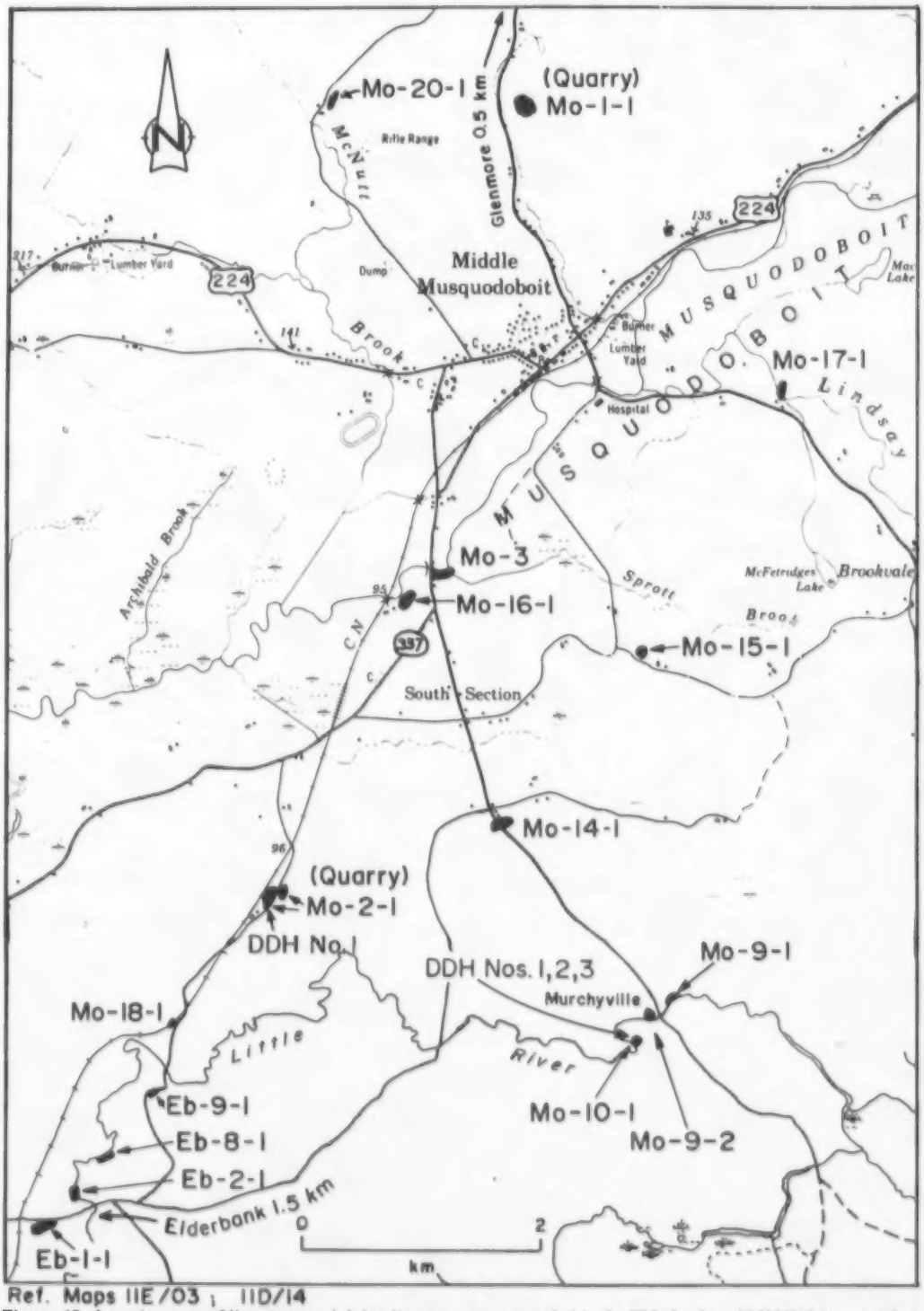
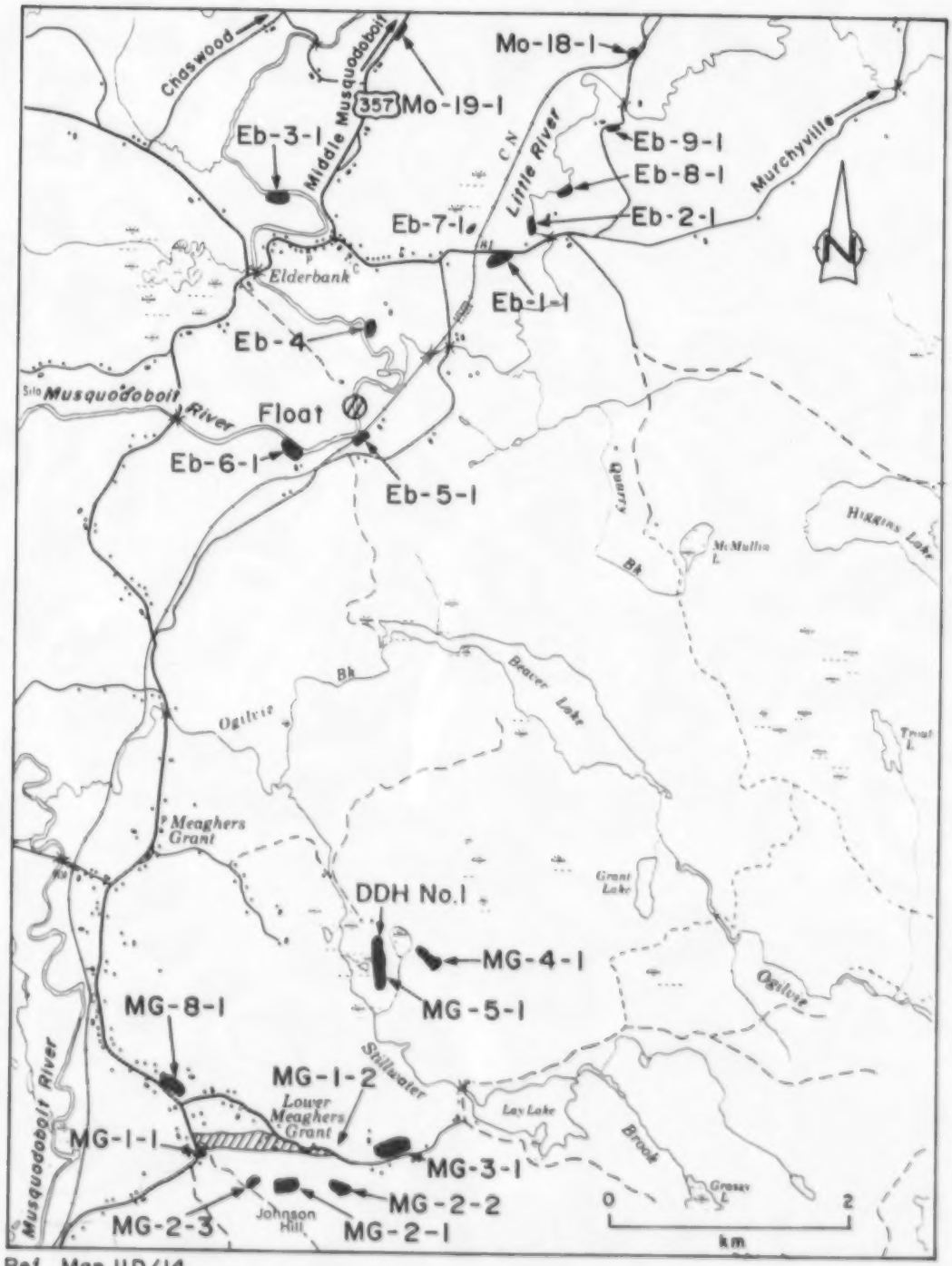


Figure 45. Location map of limestone and dolomite occurrences sampled in the Elderbank and Middle Musquodoboit areas, Halifax County (11E/03; 11D/14).



Ref. Map 11D/14

Figure 46. Location map of limestone and dolomite occurrences sampled in the Elderbank and Meaghers Grant areas, Halifax County (11D/14).

than the normal Windsor Group dolomite. No calcite veins or stringers were noticed. Some very thin sandy layers can be seen on the weathered surface due to differential weathering. The dip and strike could not be measured, but the mound is trending N 28° E.

There is no indication of the thickness or areal extent of the occurrence. Overburden does not appear to be heavy in the vicinity of the mound, however, away from the mound, the overburden probably increases rapidly. Several small pits were found from which dolomite had been extracted at one time. The surrounding area is open, flat and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-1-1	42.50%	7.10%	3.20%	29.40%	17.20%

ELDERBANK (Eb-2-1)

This occurrence is located 2 km east of Elderbank along the Elderbank-Murchyville road. The limestone outcrops on Little River, 40.8 m upstream from the bridge on the Elderbank-Murchyville road. This occurrence is 0.4 km east of Eb-1-1. The limestone outcrops along the southern bank and in the River (Figs. 45 and 46).

Description

The occurrence is light grey, hard, dense, slightly oolitic, arenaceous, dolomitic, Windsor Group limestone. The bedding is poorly developed with a light brown, smooth, weathered surface. The limestone contains a large amount of terrigenous material. It strikes N 53° W and dips 23° SW.

There is no indication as to the thickness or areal extent of this occurrence. The overburden is at least 2.4 m thick. This may be a continuation of Eb-1-1.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-2-1	34.20%	23.70%	3.40%	24.90%	13.80%

ELDERBANK (Eb-3-1)

This occurrence is located on the southern bank of the Musquodoboit River northwest of Elderbank (Fig. 47). Limestone outcrops on the bank of the River, 457 m up River from the Middle Musquodoboit-Elderbank road. This area is approximately 610 m northwest of the Village of Elderbank. The limestone outcrops at the edge of the River only and can be traced along the River for a distance of 76.2 m (Fig. 46).

Description

The occurrence is greyish-brown, hard, dense, nodular, algal, dolomitic, Windsor Group limestone. The bedding is well developed with a light brown, nodular, weathered surface. The limestone varies throughout from a nodular to a wavy stromatolitic structure (Fig. 48). No fossils were noted. Some calcite veins were found with small calcite crystals. The upper part of the limestone is thinly laminated and shows ripple marks. It strikes N 80° E and dips 15° NW into the River.

There is no indication as to the areal extent or thickness. Overburden appears to be at least 3 m thick. The surrounding area is open farmland and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-3-1	36.80%	17.0%	10.80%	24.10%	9.85%

ELDERBANK (Eb-4) (FLOAT)

This occurrence is located south of Elderbank, on the eastern bank of the Musquodoboit River. The dolomite does not outcrop, but is found as float along a 3 m embankment along the side of the River. This area is 457 m south of Elderbank in an open field through which the River runs. Float can be seen along the bank for a distance of 18.3 m (Fig. 46).

Description

The occurrence is brownish-grey, very hard, compact, medium grained, Windsor Group dolomite. The weathered surface is light brown and smooth. There is a large amount of small calcite grains mixed with detrital dolomite grains. It has a sugary texture. No fossils or cavities were noticed.

No strike, dip, thickness or areal extent could be determined. The overburden is at least 3 m thick. The surrounding area is open farmland and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-4	46.40%	1.82%	1.62%	32.90%	17.50%

ELDERBANK (Eb-5-1)

Outcrops of this occurrence are located 1.6 km south of Elderbank on the eastern side of the Musquodoboit River. The dolomite outcrops on the bank and on the bottom of the River. Dolomite is found where the bend in the River strikes the Canadian National Railway embankment (Middle Musquodoboit-Meaghers Grant line) (Fig. 46).

Figure 47. Nodular limestone outcropping along the Musquodoboit River, 610 m northwest of Elderbank, Halifax County (Eb-3-1).

Figure 48. Stromatolitic, dolomitic limestone found in the outcrop shown in Figure 47, Elderbank, Halifax County (Eb-3-1).

Description

The occurrence is dark grey, hard, dense, medium grained, arenaceous, detrital, Windsor Group dolomite. The bedding is well developed with a light brown, smooth, weathered surface. There are numerous arenaceous bands standing out on the weathered surface which show the bedding. This is a detrital dolomite with a large amount of terrigenous material. The limestone is slightly laminated in sections. It strikes N 29° E and dips 20° SE.

The dolomite is at least 3-4.6 m thick with at least 3 m of overburden. There is no indication of the areal extent. The surrounding area is wooded to the west and open farmland to the east, making the area easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-5-1	43.25%	6.05%	4.20%	28.00%	17.75%

ELDERBANK (Eb-6-1)

This occurrence is located 1.6 km south of Elderbank on the southern bank of the Musquodoboit River (Fig. 49). This dolomite outcrops 457.2 m downstream from Eb-5-1 and is found in a 4.6 m embankment. This occurrence is behind a farmhouse. The dolomite dips into the River (Fig. 46).

Description

The occurrence is dark grey, hard, very compact, fine grained, siliceous, Windsor Group dolomite. The dolomite is thickly bedded with the bedding being well developed. The weathered surface is light brown and smooth. It strikes N 10° W and dips 10° NE.

Although the dolomite can be traced along the Musquodoboit River for 152.4 m, the thickness and areal extent could not be determined because the strike parallels the River and only one individual bed can be seen. The overburden is at least 3-4.6 m thick. The surrounding area is open farmland to the south and wooded to the north of the River.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-6-1	40.75%	9.56%	4.70%	26.70%	16.90%

Figure 49. Outcrop of dolomite found along the Musquodoboit River, Elderbank, Halifax County (Eb-6-1).

ELDERBANK (Eb-7-1)

This occurrence is located 1.1 km east of Elderbank along the western side of the Canadian National Railway track. Dolomite outcrops in a small knoll in an open field approximately 152.4 m north of the Elderbank-Murchyville road at the last rail crossing before Elderbank. The dolomite is 30 m west of the railroad track and occurs as small patches of isolated outcrop in the field (Fig. 46).

Description

The occurrence is greyish-brown, hard, dense, thinly bedded, Upper Windsor Group dolomite. The bedding is well developed with a light brown, smooth, weathered surface. No fossils or cavities were found. The dolomite is flat lying.

Thickness and areal extent could not be determined due to the limited extent of the outcrop area. There is little or no overburden; the dolomite outcrops on the surface. The surrounding area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-7-1	44.65%	3.28%	2.65%	30.65%	18.25%

ELDERBANK (Eb-8-1)

This occurrence is located up Little River from the bridge on the Elderbank-Murchyville road,

2.4 km east of Elderbank. The dolomite can be found outcropping in the River and on the eastern bank, 503 m up the River from the bridge. This area is behind the farm of Roy Rhino. Most of the dolomite shows up as rubble with very little outcrop (Figs. 45 and 46).

Description

The occurrence is brown, hard, dense, Upper Windsor Group dolomite. No bedding is shown, but rubble indicates that the bedding is well developed with a light brown, smooth, weathered surface with a few cavities containing calcite. This occurrence may be a continuation of Eb-2-1. Strike and dip could not be measured.

Areal extent and thickness could not be determined due to lack of outcrop. Overburden appears to be slight. The surrounding area is mainly open farmland and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-8-1	44.25%	3.40%	2.52%	30.15%	18.45%

ELDERBANK (Eb-9-1)

This occurrence is located 3.2 km northeast of Elderbank along the back road between Middle Musquodoboit and Elderbank. Dolomite outcrops along the southern side of the road across from the farm of J. E. Castle. Very little outcrop can be seen, but a large amount of rubble can be found in the ditch. This area is 3.4 km south of the main Middle Musquodoboit-Elderbank Route 357 on the back road (Figs. 45 and 46).

Description

The dolomite is brown, hard, dense, thickly bedded and belongs to the Upper Windsor Group. It appears that the bedding is well developed with a smooth, light brown, weathered surface. A few cavities were found lined with calcite crystals. The strike and dip could not be measured.

There is no indication as to thickness or areal extent. The overburden appears to be at least 3 m thick. The surrounding area is open farmland and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Eb-9-1	44.60%	3.40%	2.12%	31.50%	17.605%

GAYS RIVER AREA

GAYS RIVER (GR-1-1)

This occurrence is located south of Gays River, 1107.6 m up the South Branch Gays River from where it empties into the main branch of the Gays River. Dolomite can be found outcropping on the eastern bank and on the bottom of the River. The dolomite can be traced along the River for a distance of 53 m. The dolomite is resting unconformably on quartzite of the Goldenville Formation which can be seen outcropping downstream from this occurrence (Fig. 50).

Description

The occurrence is light brown, hard, highly fossiliferous, slightly massive, B Subzone, Windsor Group dolomite. The bedding is not well developed and the weathered surface is light brown and pitted. The fossils found are gastropods, brachiopods and pelecypods. Some mineralization is associated with the dolomite (mainly galena which is found only as small blebs). Some sections of the dolomite are more fossiliferous than others.

The dolomite appears to be almost flat lying with an apparent strike of N 72° W and a slight dip to the southwest. The dolomite generally forms the basal Windsor Group contact with the Meguma Group quartzite in the area and can be traced in various locations along the Meguma contact.

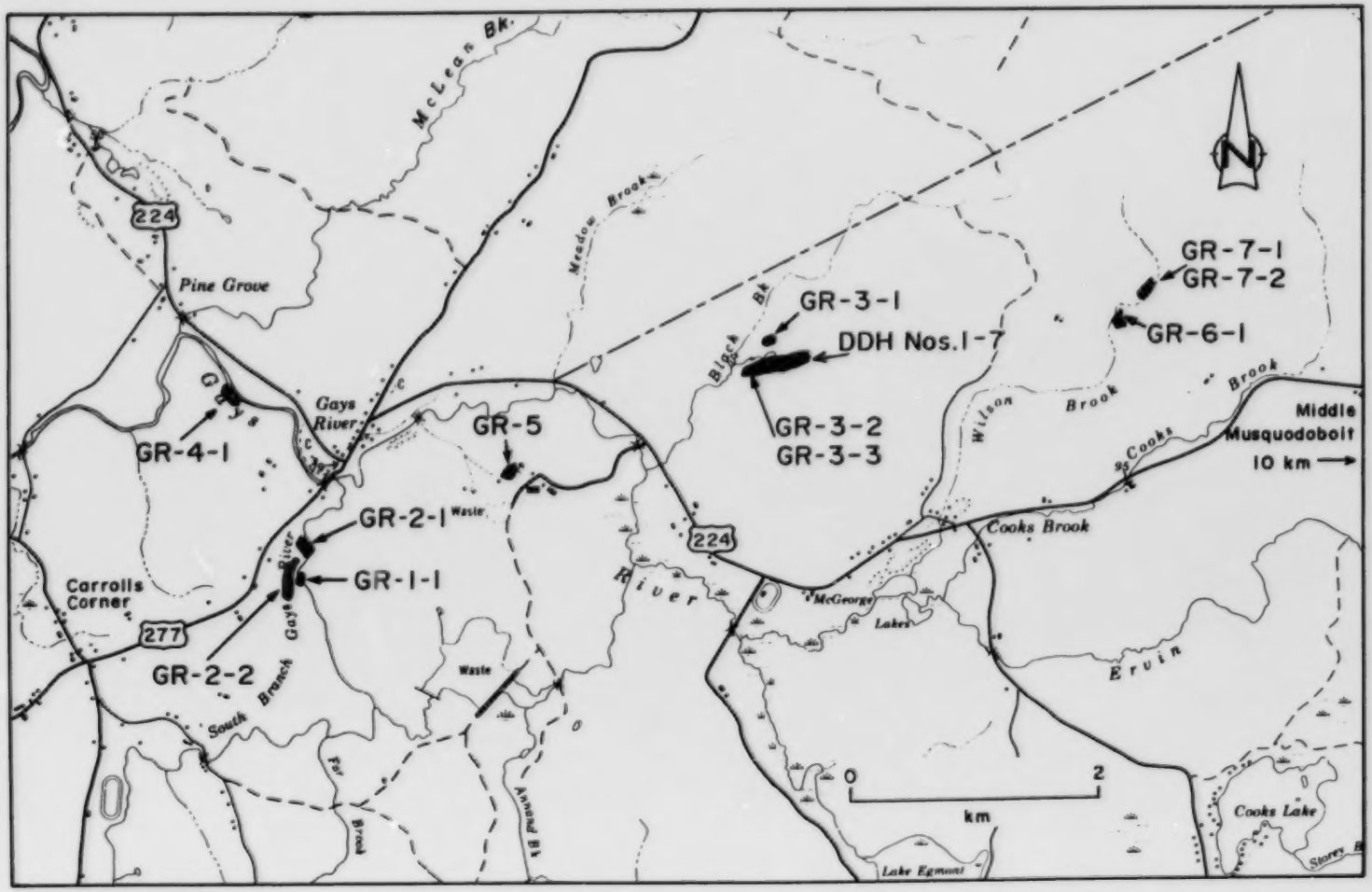
There is no indication as to the thickness or areal extent. Away from the South Branch Gays River, the dolomite is drift covered, although the overburden does not appear to be very thick in this immediate area. The surrounding area is fairly flat with open fields to the west and wooded areas to the east.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-1-1	46.60%	0.60%	1.85%	32.55%	18.50%

GAYS RIVER (GR-2-1)

This occurrence is located south of Gays River. Dolomite can be found outcropping 844.3 m up the South Branch Gays River from where it empties into the Gays River and 262 m downstream from GR-1-1. These two occurrences are separated along the River by Goldenville Formation quartzite which underlies the dolomite. The dolomite can be traced in and on both sides of the River for a distance of 56 m. All of the dolomite outcrops in this area are controlled by the underlying Meguma Group in that the dolomite follows the contact and dips basinward where it is overlain by gypsum and anhydrite (Fig. 50).



Ref. Map 11E/03

Figure 50. Location map of limestone and dolomite occurrences sampled in the Gays River area, Halifax County (11E/03).

Description

The occurrence is light grey, soft, slightly fossiliferous, clayey, massive, Windsor Group dolomite. The bedding is very poorly developed with a light brown, pitted, weathered surface. The fossils found are bryozoans and brachiopods. It appears to be almost flat lying, but could possibly strike towards the northwest with a slight dip to the southwest.

Away from the outcrop area, the dolomite is drift covered so that no indication of thickness or areal extent could be found. The surrounding area is mainly open land and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-2-1	46.85%	0.35%	1.67%	31.10%	20.40%

GAYS RIVER (GR-2-2)

This occurrence is located on the western side of South Branch Gays River, just south of the Village of Gays River. Dolomite outcrops in various locations in an open field and in the woods, 304.8 m southeast of Route 227. These outcrops are a continuation of the dolomite at GR-1-1 and GR-2-1 (Fig. 50).

Description

The occurrence is brown, slightly porous, fossiliferous, mineralized, B Subzone, Windsor Group dolomite. The bedding is poorly developed with a light brown, rough, weathered surface. The associated mineralization consists mainly of galena with minor amounts of sphalerite being found. A white staining is usually found when any mineralization is present. The fossils found consist of brachiopods, gastropods, conularias and bryozoans. Most of the shells have been destroyed by dolomitization. Numerous cavities are found with a large amount of calcite filling these cavities. Galena is disseminated as small blebs throughout. It strikes N 30° W and dips 24° NE.

There is no indication as to the total thickness. The overburden is very slight. A large amount of drilling and trenching has been carried out at various times to determine the lead-zinc content of the dolomite. The dolomite is found along the Windsor-Meguma contact and unconformably overlies the Meguma Group.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-2-2	43.00%	5.00%	1.90%	29.10%	18.00%

GAYS RIVER (GR-3-1)

This occurrence is located approximately 3.4 km northeast of Gays River, near Black Brook. This dolomite has been quarried by Mosher limestone and is accessible by the quarry road. The dolomite outcrops in a small brook 213.4 m up from the ponds (Fig. 50).

Description

The occurrence is brown, soft, slightly porous, fossiliferous, massive, B Subzone, Windsor Group dolomite. The bedding is very poorly developed with a light brown, pitted, weathered surface. The fossils found are mainly brachiopods with a few *Conularia planicostata*. There are some calcite stringers and some stylolites with dark carbonaceous material along the seams. There is no indication as to strike or dip because of the lack of outcrop area and massive nature of the dolomite.

No indications could be found for thicknesses or areal extent of the dolomite. The overburden appears to be light in this area. The area is wooded and not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-3-1	46.80%	0.30%	1.92%	32.40%	18.90%

GAYS RIVER (GR-3-2) (GR-3-3) (DIAMOND DRILLING)

This occurrence is located east of Black Brook. This deposit of dolomite is in the vicinity of GR-3-1 and is located along the same old woods road. The first outcrop shows up in the clearing where the saw mill was located (see location for GR-3-1). This area is 1050 m northeast of Route 224 between Middle Musquodoboit and Gays River. The dolomite is found on the northern part of this clearing and can be traced along the side of the hill in a N 65° E direction for 746.8 m. The dolomite runs along the southern side of a bank of gypsum with a string of water filled sinkholes. The dolomite is resting unconformably on Goldenville Formation quartzite which outcrops to the south of the dolomite. This area is a small embayment into the older Meguma Group rocks (Fig. 50).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Gays River area.

Description

The occurrence is brown, slightly porous, massive, fossiliferous, B Subzone, Windsor Group dolomite. The bedding is very poorly developed with a brown, smooth, weathered surface. The fossils found are brachiopods, bryozoans and a few gastropods. There are numerous cavities throughout. GR-3-2 was taken from the western end of the dolomite, and GR-3-3 was taken from the eastern end. The dolomite is overlain by gypsum to the north and by quartzite to the south.

The strike and dip could not be measured because of the massive nature of the rock, however it appears to be striking N 65° E and dipping towards the north.

There is very little overburden covering the dolomite as outcrop and rubble can be seen along most of the 0.8 km strike length of the deposit. The gypsum found north of the dolomite is extensive and covers a wide area. The area is heavily wooded and is not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-3-2	46.65%	0.33%	1.73%	32.90%	18.70%
GR-3-3	46.35%	0.68%	1.98%	32.20%	18.85%

GAYS RIVER (GR-4-1)

This occurrence is located on Gays River, midway between the Village of Gays River and where McLean Brook empties into the Gays River. The limestone can be found outcropping mainly along the southwestern side and on the bottom of the River, 792.5 m upstream from where McLean Brook empties into Gays River. The outcrop area along the bank of Gays River is very limited. Limestone can be traced along the River for a distance of 45.7 m (Fig. 50).

Description

The occurrence is light brown, very porous, fairly soft, massive, Windsor Group limestone (Fig. 51). There are numerous cavities throughout. The bedding is very poorly developed with a light brown, pitted, weathered surface. There are a few small calcite stringers. The limestone contains a brownish-yellow, powdery substance on the fresh surface (probably limonite). Gypsum is found associated with the limestone and outcrops 9 m away from the limestone. It is difficult to determine which overlies which because of the lack of bedding in each. Brachiopods are the only recognizable fossils. The strike and dip, as well as the thickness and areal extent, could not be determined.

Away from the River, the overburden appears to be at least 12 m thick. The area is wooded and not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-4-1	41.10%	3.84%	3.10%	49.75%	1.16%

Figure 51. Massive, porous Windsor Group limestone found in an outcrop on Gays River, Halifax County (GR-4-1).

GAYS RIVER (GR-5) (FLOAT)

Dolomite float is located 1.3 km due east of the Gays River intersection. The dolomite is found as float at the edge of the woods 122 m east of a farmhouse. Dolomite can be found in the rock pile at the edge of the field. These rocks have been taken off the field (Fig. 50).

Description

The float is hard, brownish-grey, massive, fossiliferous, B Subzone, Windsor Group dolomite. This rock is similar to that found at GR-2-1 and GR-2-2, except that no galena was found. The fossils noticed are pelecypods and brachiopods. There are numerous fossil cavities, but very little infilling of calcite has taken place. The weathered surface is brown and pitted.

On the old geology map of this area, Faribault (1907) indicated outcropping behind the farmhouse, but no outcrop could be found.

Note: This area is now the site of the Gays River lead-zinc mine (inactive).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-5	48.80%	1.20%	1.45%	31.40%	19.30%

GAYS RIVER (GR-6-1)

This occurrence is located northeast of Cooks Brook, approximately 1.6 km north of Route 224. The dolomite can be found outcropping on Wilson Brook, 2.4 km up the Brook from Route 224 at Cooks Brook. Dolomite is found on the southeastern bank of the Brook in a 7.6 m high embankment. The dolomite is resting unconformably on Meguma Group quartzite (Figs. 50 and 52).

Description

The occurrence is greyish-brown, hard, thinly bedded limestone at the bottom grading into a more massive, fossiliferous, B Subzone, Windsor Group dolomite at the top. Bedding is well developed with a smooth, light brown, weathered surface. The fossils found include conularia, which are very large, very abundant and distorted, similar to those found in the Upper Musquodoboit dolomite quarry. Pelecypods are also abundant with some brachiopods. Calcite is very abundant, replacing some of the conularia and the brachiopods. There are no fossils in the bottom 0.5-1 m and the dolomite contains numerous fragments of the underlying quartzite up to 3 m into the dolomite from the contact. Towards the top the dolomite becomes very fossiliferous. It strikes N 62° W and dips 39° SW.

The dolomite is 6-7.6 m thick with very little overburden. The dolomite cannot be found outcropping away from the Brook. This area was apparently quarried at one time for agricultural uses. The area is heavily wooded and is not easily accessible. An old road once serviced the quarry, but cannot be followed now.

The following analysis is a channel sample and the analysis is more indicative of the lower section of the limestone which contains the quartzite fragments. Near the top, the dolomite has a much lower SiO_2 content.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-6-1	28.20%	34.00%	5.80%	25.80%	4.60%

GAYS RIVER (GR-7-1) (GR-7-2)

This occurrence is located 152.4 m up Wilson Brook from GR-6-1 and outcrops on the northwestern bank of the Brook. This area is located 2.4 km north of Cooks Brook. The dolomite outcrops in a 6-7.6 m embankment and is north of the Meguma-Windsor contact. The dolomite only outcrops along the Brook (two locations), but the hill can be traced down the Brook (Fig. 50).

Description

The occurrence is dark brown, porous, slightly fossiliferous, massive, Windsor Group dolomite. It appears to be lying directly on Meguma Group quartzite. The bedding is very poorly developed with

Figure 52. Contact zone between the overlying Windsor Group dolomite and the underlying quartzite of the Meguma Group, found near Gays River, Halifax County (GR-6-1).

a rough, pitted, dark brown, weathered surface. Calcite is quite abundant, filling the cavities. The strike and dip could not be measured because of the massive nature of the rock. This occurrence is located north of the Meguma-Windsor contact and appears to be a Windsor outlier in the Meguma Group. There is no indication as to thickness or amount of overburden. The area is heavily wooded and not easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
GR-7-1	45.60%	1.20%	2.17%	31.60%	19.00%
GR-7-2	46.00%	1.34%	2.40%	30.90%	19.05%

LANTZ AREA

LANTZ (Lz-1-1)

This occurrence is located along the eastern side of the Shubenacadie River at Lantz. The limestone outcrops on the bank and on the bottom of the River, 243.8 m downstream from the bridge which crosses the Shubenacadie River on Route 277. The limestone can be traced along the River for a distance of 114.3 m (Figs. 53 and 54).

Description

The occurrence is grey, hard, fossiliferous, massive, Windsor Group limestone (Fig. 55). The bedding is poorly developed with a rough, light brown, weathered surface. It contains small cavities,

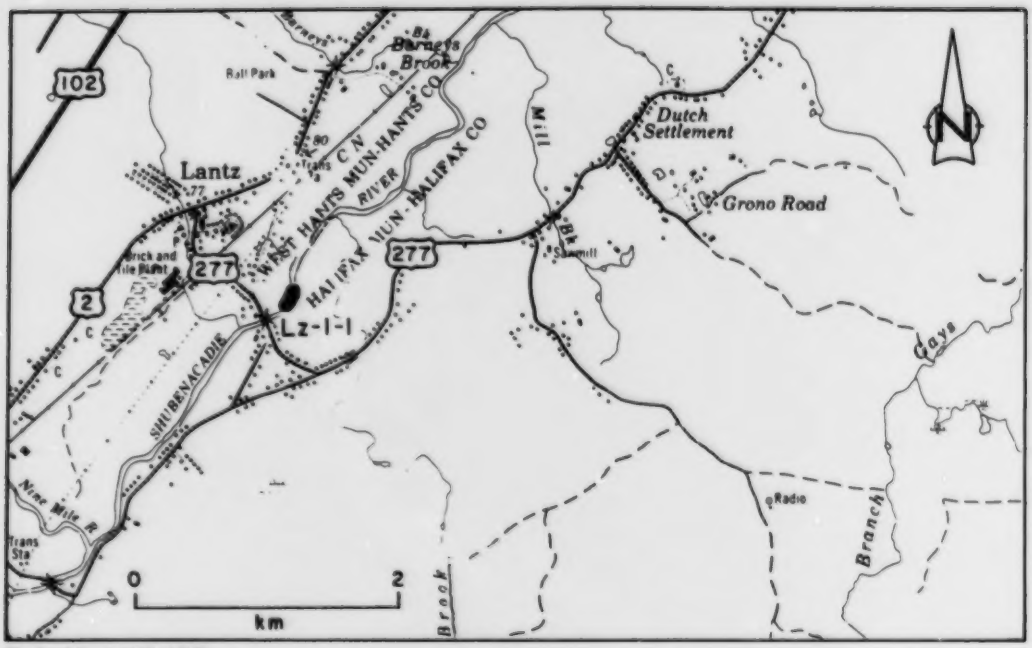


Figure 53. Location map of limestone occurrence sampled in the Lantz area, Halifax County (11E/03).

some filled with calcite. The fossils are scarce or have been destroyed. The only ones found are brachiopods. The rock contains some iron staining. In places, the limestone is very compact. It strikes N 10° W and dips gently (10°-15°?) to the southwest. The jointing is fairly pronounced and is at right angles at N 65° E and N 25° W.

There is no indication as to areal extent or thickness of the limestone. The overburden is only slight on the eastern side of the Shubenacadie River and becomes increasingly thicker on the western side. The surrounding area is wooded to the east with open fields to the west.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Lz-1-1	43.25%	1.08%	0.40%	54.50%	0.65%

MEAGHERS GRANT AREA

MEAGHERS GRANT (MG-1-1)

This occurrence is located at Lower Meaghers Grant along Route 357 running from Middle Musquodoboit to Musquodoboit Harbour. It outcrops in a 4.6 m embankment on the eastern side of

Figure 54. Limestone outcropping along the Shubenacadie River, southeast of Lantz, Halifax County (Lz-1-1).

Figure 55. Limestone found in the outcrop in Figure 54, Shubenacadie River, Halifax County (Lz-1-1).

the road with a small outcrop on the western side, 0.32 km south of the Lower Meaghers Grant to Lay Lake road. The limestone occurs at a right angle turn in the highway (Fig. 46).

Description

The occurrence is very hard, grey, compact, detrital, medium grained, arenaceous, Pennsylvanian(?) limestone. The limestone contains sand grains and muscovite flakes. The sandy layers stand out on the weathered surface and show the differential weathering of the sandstone and limestone. Underlying the limestone is a calcareous sandstone interlayered with shale. The sandstone contains small plant fossils which are characteristic of the Pennsylvanian(?) period. The bedding is well developed with a light brown, weathered surface. There is some calcite along the jointing planes. It is striking N 70° W and dipping 8° NE. The jointing is striking N 20° E and dipping 90°.

A 6 m section can be seen along the eastern side of the road. Away from the road, the limestone outcrops very little so that the total thickness cannot be seen. There is very little overburden. The surrounding area is hilly and mainly cleared land.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-1-1	31.10%	24.90%	3.47%	39.05%	0.71%

MEAGHERS GRANT (MG-1-2)

This outcrop appears to be a continuation of MG-1-1 which is found along Route 357. Outcroppings of this limestone can be found in various places along strike, in the fields and along the Lay Lake road. This limestone outcrops on the southern side of the Lay Lake road, 1.6 km east of Route 357 (Fig. 46).

Description

The occurrence is dark grey, very hard, compact, detrital, medium grained, arenaceous, Pennsylvanian(?) limestone. The sandy layers show differential weathering. The weathered surface is light brown.

There is no indication as to the strike or dip, however the limestone can be traced eastward for a distance of 1.1 km from MG-1-1 to MG-1-2. The various outcrop areas are small. It appears to be dipping in a northerly direction.

There is no indication as to the actual thickness, however it appears to be at least 6 m thick. The occurrence appears to be continuous over a 1.6 km distance.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-1-2	30.45%	28.60%	2.17%	38.30%	0.50%

MEAGHERS GRANT (MG-2-1)

MG-2-1 is located south of MG-1-2 and appears to be underlying MG-1-2. Limestone outcrops in a wooded area, 447.4 m on a bearing of 155° from the Post Office on the Lay Lake road. The Post Office is 1 km east of Route 357. The limestone outcrops at the northern base of Johnson Hill (Fig. 46).

Description

The occurrence is grey, hard, massive, slightly fossiliferous, Windsor Group limestone. The bedding is very poorly developed with a light brown, smooth, rounded, weathered surface. There are a large number of calcite blebs throughout the limestone. The limestone appears to be striking N 55° E and dipping 30°-35° NW.

No indication of thickness or areal extent can be found. The surrounding area is hilly and heavily wooded, but is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-2-1	40.65%	5.43	1.49%	51.10%	0.90%

MEAGHERS GRANT (MG-2-2)

MG-2-2 is found approximately 304.8 m east of MG-2-1 and appears to be the same type of limestone. Limestone can be found outcropping in a cut-out area approximately 335.3 m south of the Lay Lake road (Fig. 46).

Description

This is a grey, hard, massive, slightly fossiliferous, Windsor Group limestone. The weathered surface is light grey and rounded. The bedding is very poorly developed. The fossils noted are brachiopods. There is no indication as to strike or dip, however it appears to be flat lying. This outcrop appears to be a continuation of the limestone found at MG-2-1.

There is very little indication of the areal extent or thickness of the limestone. There appears to be very little overburden. The area is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-2-2	41.80%	2.50%	2.74%	51.50%	0.84%

MEAGHERS GRANT (MG-2-3)

This outcrop of dolomite appears to be a continuation of the limestone found at MG-2-1 and MG-2-2. The outcrop is located at Lower Meaghers Grant, along the road which runs to the fire tower on Johnson Hill. Outcrops are found on the northern side of this road, 737.3 m from Route 357. The dolomite can be traced for a distance of 122-152.4 m in a northeasterly direction along the base of Johnson Hill (Fig. 46).

Description

The occurrence is greyish-brown, hard, fossiliferous, massive, Windsor Group dolomite. The bedding is very poorly developed with a rough, light brown, weathered surface. The fossils found are gastropods and cephalopods(?) and long, rounded structures which may be corals(?). These structures are composed of calcite. Brachiopods are also common.

The dolomite is lapping up on the northern flank of the underlying Moose River Anticline which belongs to the Meguma Group. There is no indication as to strike or dip of the dolomite. It appears, however, to be trending in a N 55° E direction along the base of the hill.

There is no indication as to areal extent or thickness of the dolomite. The overburden does not appear to be very thick because of the small outcrop areas all along the base of the hill.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-2-3	45.60%	1.18%	2.82%	32.10%	18.50%

MEAGHERS GRANT (MG-3-1)

This occurrence is located at Lower Meaghers Grant along the Lay Lake road, 1.8 km east of Route 357. The limestone outcrops in a 10.7 m high mound on the eastern side of a branch of Ogilvie Brook, 91.4 m north of where this brook crosses the Lay Lake road. Outcrops can be seen in the field and on the eastern side of a farm road (Fig. 46).

Description

This limestone ranges from brown, hard, slightly porous, massive, dolomitic material on the bottom

grading into dark grey, very hard, compact, fossiliferous, massive, Windsor Group limestone towards the top of the section. The bedding is very poorly developed with a light brown, rough, weathered surface. The only fossils noted are brachiopods and these are not abundant. The limestone is overlain by a thinly bedded Pennsylvanian(?) sandstone and a calcareous sandstone showing differential weathering of the calcareous and siliceous parts.

There is no indication as to the strike or dip of the limestone because of its massive nature. The overlying material is striking N 53° W and dipping in a northeasterly direction. Nowhere can the limestone be seen in contact with the sandstone.

There is no indication as to the thickness of the limestone, but the occurrence does not appear to be very extensive. There is very little overburden and the surrounding area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-3-1	44.15%	0.95%	1.93%	44.46%	8.10%

MEAGHERS GRANT (MG-4-1)

This occurrence is located approximately 2.6 km southeast of Meaghers Grant. The dolomite is found in a mound on the eastern side of a small pond which is located just east of the abandoned W. Grant farm at the end of the Grant road. This mound can be seen outcropping near the old road which runs around the southern end of the pond, 823 m from the Grant farm. The mound strikes N 45° W towards the pond. The dolomite can be found outcropping 134 m east of the road, up a gully where it comes in contact with quartzite of the Goldenville Formation. The water in a brook crosses the quartzite and then disappears into the dolomite at the contact (Fig. 46).

Description

The occurrence is dark brown, hard, slightly fossiliferous, massive, Windsor Group dolomite. Where the dolomite comes in contact with the quartzite, the dolomite is much harder and more compact with no fossils. Gastropods are the only fossils noted. The bedding is very poorly developed with a rough, dark brown, weathered surface. The dolomite appears to be flat lying.

The dolomite is found in a mound which stands approximately 4.6-6 m above the surrounding ground. The mound varies from 15-30 m wide across the top and is 243.8 m long. Very little overburden is covering the dolomite along the top of the mound.

There is no indication as to the thickness of the dolomite. The surrounding area is wooded, but has been cut out to some extent making the area accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-4-1	45.95%	0.67%	2.68%	32.40%	18.65%

MEAGHERS GRANT (MG-5-1) (DIAMOND DRILLING)

This occurrence is located 2.6 km east of Route 357, at the end of the Grant road. Dolomite outcrops in various locations on the abandoned farm of W. Grant. The dolomite is found in a mound which strikes N 45° W and can be seen outcropping along this mound southward from the house for a distance of 280.4 m. Dolomite can also be found outcropping to the east of the farmhouse, along the western side of the pond (Fig. 46).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Meaghers Grant area.

Description

The occurrence is brown, hard, massive, fossiliferous, Windsor Group dolomite, similar in appearance to that found on the eastern side of the pond (MG-4-1). The fossils found are gastropods. The bedding is very poorly developed with a dark brown, rough, weathered surface. The underlying Meguma Group can be seen outcropping along this mound in various location, indicating that the dolomite forms only a thin covering over the Meguma rock. The dolomite is flat lying.

The surrounding area is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-5-1	45.85%	0.94%	3.20%	30.70%	19.30%

MEAGHERS GRANT (MG-6-1)

This occurrence is located approximately 2.5 km west of Meaghers Grant on a small brook which runs eastward and joins the Musquodoboit River at Meaghers Grant. This brook crosses a farm road 0.97 km south of the Meaghers Grant-Wyses Corner road. The farm road turns off the Meaghers Grant-Wyses Corner road 1.85 km west of Meaghers Grant. The dolomite can be found outcropping in a mound trending north along the side of this brook. It outcrops in various places along the brook, 579.1 m up from the farm road and again, 1219.2 m up from the farm road (Fig. 44).

Description

The occurrence is grey, very hard, highly fractured, slightly siliceous, Windsor Group dolomite. The bedding is very poorly developed because of the extensive fracturing. The weathered surface is rough, showing some differential weathering. There is a large amount of black carbonaceous material on the stylolites. The dolomite can be seen outcropping for a distance of approximately 610 m. There is no indication as to the strike or dip, but the mound is trending north-south.

The mound in which the dolomite is found ranges up to 9.1 m in height and can be traced in a southerly direction. There is no indication as to the thickness or areal extent except in the vicinity of the mound. The farthest extension of the dolomite is 1219.2 m up the brook. Here the dolomite is very hard and oolitic. It is conformably underlain here by a medium grained, grey, micaceous greywacke. This greywacke probably belongs to the Horton Group. Farther up the brook this greywacke is underlain by Goldenville Formation quartzite.

The area is easily accessible by numerous old woods roads which crisscross the area.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-6-1	43.50%	5.86%	3.00%	29.99%	17.60%

MEAGHERS GRANT (MG-7-1)

This occurrence is located approximately 2.5 km west of Meaghers Grant, on a small brook which runs eastward and joins the Musquodoboit River at Meaghers Grant. Dolomite outcrops on both sides of this small brook. This occurrence is 152.4 m downstream from MG-6-1. The dolomite outcrops at the edge of the woods (Fig. 44).

Description

This is a very hard, grey, fine grained, Windsor Group dolomite. The bedding is well developed and the weathered surface is light brown and smooth. Calcite is found as stringers. This dolomite varies greatly from that found at MG-6-1, 152.4 m up the brook. It strikes N 10° E and dips 9° NW.

There is no indication as to the thickness or areal extent because the dolomite outcrops only in the brook. There is probably at least 6 m of overburden covering the dolomite. The area is only lightly wooded and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-7-1	45.50%	1.92%	2.57%	30.10%	19.45%

MEAGHERS GRANT (MG-8-1)

This occurrence is located at Meaghers Grant along the eastern ditch of Route 357. Limestone can be found outcropping in the ditch 0.3 km north of the Lay Lake road. This area is found in the most heavily populated area of Meaghers Grant (Fig. 46).

Description

The occurrence is grey, very hard, dense, Windsor Group limestone. The bedding is well developed with a light grey, smooth, weathered surface. The upper part of the limestone is more massive and purer than the lower section. The bottom section becomes very arenaceous with a well developed bedding. There are some calcite stringers. It is flat lying.

There is no indication as to thickness or areal extent because the surrounding area is cultivated. The overburden appears to be light over most of the area. The surrounding area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
MG-8-1	42.30%	2.60%	0.68%	53.60%	0.51%

MIDDLE MUSQUODOBOIT AREA

MIDDLE MUSQUODOBOIT (Mo-1-1)

Outcrops of this occurrence are located 1.9 km north of Middle Musquodoboit on the Glenmore road. The dolomite outcrops in a quarry which is located 152.4 m east of the Glenmore road. The walls in this dolomite quarry reach a height of 9-12 m in some places. The dolomite can also be seen on the floor of the quarry (Fig. 45).

Description

The occurrence is light brown, very hard, dense, massive, fossiliferous, B Subzone, Windsor Group dolomite. The bedding is very poorly developed with a light brown, smooth, weathered surface. The bedding is easily distinguished in some parts of the quarry. The fossils found are brachiopods, gastropods and some bryozoans. The fossils are very small. The jointing is well developed and is almost perpendicular to the strike. The lowermost section of the dolomite contains large, rounded boulders of the Halifax and Goldenville Formations. Some of these boulders were found in some of the higher sections. On the southern side of the quarry, the dolomite can be seen unconformably overlying the Halifax Formation slates. There is some slickensiding as well as calcite blebs on some of the surfaces. The strike is N 71° E and dip is 40° SE.

There is very little overburden and the dolomite appears to be at least 12 m thick. The purer parts of the dolomite appear to have been quarried out, thus making the dolomite of very little value.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-1-1	43.70%	6.10%	3.58%	29.20%	17.95%

MIDDLE MUSQUODOBOIT (Mo-2-1) (DIAMOND DRILLING)

This occurrence is located on the back road to Elderbank, 4.8 km southwest of Middle Musquodoboit. The limestone is found in a small quarry on the property of William Murchy. The limestone is found on both sides of the road and also in the fields on either side of the railroad tracks (Fig. 45).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Middle Musquodoboit area.

Description

This is a grey, hard, fossiliferous, E Subzone, Windsor Group limestone. The bedding is well developed with a light brown, smooth, weathered surface. The fossils found are brachiopods (*Gigantoproductus*) and chain corals (*Lithostrotion*) and one cephalopod. The fossiliferous layer seems to form only a 1.2-1.5 m layer over a brown, hard, more massive dolomitic limestone. This lower section appears to contain no fossils. The limestone is flat lying and covers a wide area.

There is no indication as to the thickness of the limestone. There is very little overburden because limestone can be seen outcropping in the hay fields on the Murchy property. The area is easily accessible and is mainly open land.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-2-1	42.00%	5.56%	2.08%	44.95%	5.90%

MIDDLE MUSQUODOBOIT (Mo-3) (FLOAT)

This float can be found along the southern shore of the Musquodoboit River, 1.6 km south of Middle Musquodoboit. This float can be found along the southern bank of the River for a distance of 122 m eastward from the bridge which crosses the Musquodoboit River on the Middle Musquodoboit to Musquodoboit Harbour road (Route 357). Nowhere was the limestone found to be outcropping (Fig. 45).

Description

The float is grey, hard, compact, slightly fossiliferous, massive, Windsor Group dolomite. The weathered surface is light brown and smooth. The only fossils noted were very small brachiopods and a few small cephalopods.

The float is very abundant along the shore of the Musquodoboit River. The overburden appears to be fairly thick, ranging up to 6 m in thickness.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-3	45.90%	1.90%	2.00%	30.25%	20.10%

MIDDLE MUSQUODOBOIT (Mo-4-1)

This occurrence is located on Lindsay Brook which is located 7 km southeast of Middle Musquodoboit and 3.2 km east of Brookvale. The limestone can be found outcropping near the top of a 15.2 m embankment on the western side of the Brook, 597.4 m up the western branch of Lindsay Brook from the intersection of the eastern and western branches (Fig. 56).

Description

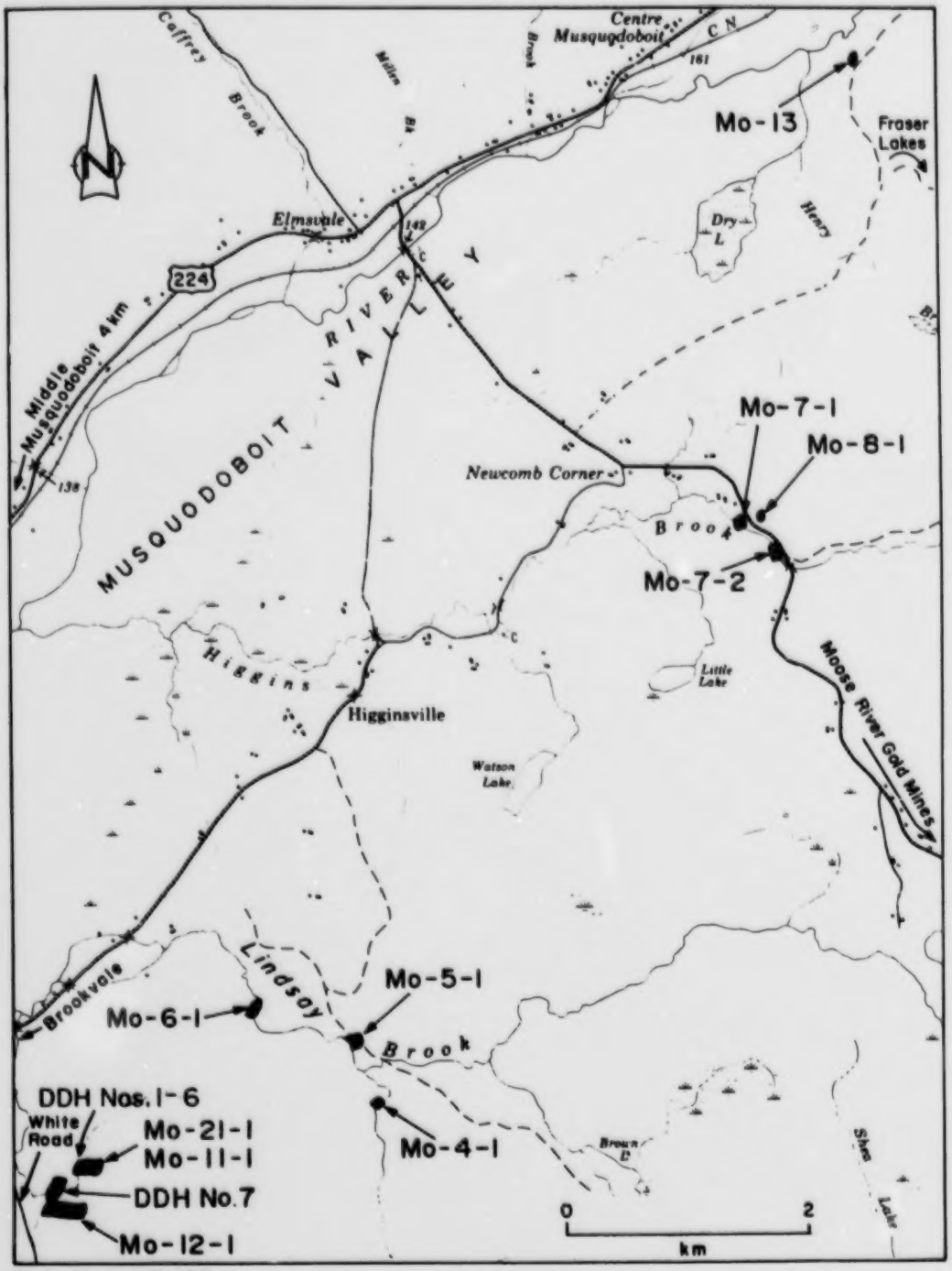
The occurrence is light brown, very hard, compact, massively bedded, Windsor Group dolomite. The bedding is not too well developed and the weathered surface is a light tan colour and has a smooth surface. There is only one small area where outcrop was found. However, there are several large dolomite boulders along the side of the hill. This section of Windsor Group is completely surrounded by the Halifax Formation slates and forms a small pocket sitting on the slates. Some slumping has occurred in the outcrop area, but the dolomite appears to be almost flat lying.

There is no indication as to thickness or areal extent of the dolomite, although float can be found in Lindsay Brook from here down to the intersection of the eastern and western branches. The overburden appears to be extensive here.

The area is heavily wooded and is 3.2 km from any public road, although old logging roads are found throughout the area.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-4-1	46.10%	1.80%	1.96%	30.40%	20.20%



Ref. Map 11E/03

Figure 56. Location map of limestone and dolomite occurrences sampled in the Middle Musquodoboit area, Halifax County (11E/03).

MIDDLE MUSQUODOBOIT (Mo-5-1)

This occurrence of dolomite is found along Lindsay Brook, 7 km southeast of Middle Musquodoboit. The dolomite can be found outcropping on the eastern side of the Brook, 222.5 m downstream from the intersection of the eastern and western branches of Lindsay Brook (Fig. 56).

Description

The occurrence is grey, very hard, compact, massively bedded, Windsor Group dolomite. The bedding is very poorly developed with a light brown, smooth, weathered surface. No fossils were noticed and only a few, thin, calcite stringers are evident. The dolomite forms an unconformable contact with the underlying Halifax Formation.

The dolomite appears to be striking N 65° E, but, due to the massive nature of the bedding and the small areal extent of the outcrop, it is impossible to measure directly.

There is no indication as to the thickness or areal extent of the occurrence. The overburden appears to be only slight. The area is heavily wooded and hilly and is only accessible by old logging roads.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-5-1	44.20%	1.94%	4.52%	30.70%	17.80%

MIDDLE MUSQUODOBOIT (Mo-6-1)

This occurrence is located on Lindsay Brook, approximately 6.4 km southeast of Middle Musquodoboit. The dolomite outcrops 226 m up the Brook from a gravel pit. This dolomite can be traced up the western side of the Brook for a distance of 12 m. The dolomite is then cut off by Halifax Formation slates for a distance of 97.5 m up the Brook. The dolomite then outcrops again for a distance of 402.3 m up the Brook and is cut off again by the slates (Fig. 56).

Description

The occurrence is dark grey, hard, compact, fossiliferous, massive, B Subzone, Windsor Group dolomite. The bedding is very poorly developed with a light brown, smooth, weathered surface. At the contact, large slate fragments are found in the dolomite. Numerous calcite blebs are found replacing the brachiopods. Stylolites are abundant. Gastropods are the most abundant fossil type found with a few *Paraconularia planicostata*. The fossils are very poorly preserved because of compaction. Minor amounts of mineralization can be seen in the dolomite. The dolomite appears to be striking N 15° E and dipping 55° NW, however it is difficult to distinguish because of the massive bedding.

There is very little indication as to the thickness or areal extent of the dolomite because it is in contact with the slate to the west and south and it becomes drift covered basinward. The area is heavily wooded and hilly and is only accessible by old logging roads.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-6-1	43.75%	3.70%	3.92%	30.10%	17.65%

MIDDLE MUSQUODOBOIT (Mo-7-1) (Mo-7-2)

This occurrence is located on Higgins Brook, approximately 1 km east of Newcomb Corner and approximately 10 km east of Middle Musquodoboit. The dolomite outcrops only in the Brook, on the side of the Brook. The area is behind the farm of J. Bryson Fraser at Newcomb Corner. The dolomite can be found outcropping in two locations in Higgins Brook, 30.5 m apart (Fig. 56).

Description

The occurrence is dark grey, hard, argillaceous, siliceous, Windsor Group dolomite. The bedding is well developed and ranges up to 5 cm in thickness. The weathered surface is light brown and smooth. The bedding surfaces contain small amounts of pyrite coating. It strikes N 73° W and dips 13° NE.

There is no indication as to the areal extent or thickness of the dolomite. There appears to be a considerable amount of overburden away from the Brook.

The surrounding area is hilly and heavily wooded, although the area is very close to the Newcomb Corner-Moose River Gold Mines road. Sample Mo-7-2 was taken 256.6 m up Higgins Brook from Mo-7-1. At Mo-7-1 the dolomite is slightly more calcareous and a siltstone is found overlying it. The dolomite is laminated.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-7-1	45.50%	1.92%	2.57%	30.10%	19.45%
Mo-7-2	40.10%	10.80%	6.03%	26.30%	17.50%

MIDDLE MUSQUODOBOIT (Mo-8-1)

This occurrence is located along the eastern side of the road running from Newcomb Corner to Moose River Gold Mines. This occurrence outcrops in an embankment beside the road, 0.16 km southeast of the J. Bryson Fraser farmhouse. The limestone is 183 m east of Mo-7-1 and is north of

Mo-7-2. Construction has been carried out along this road and has uncovered a small area of outcrop in the bank. This is approximately 1.2 km southeast of Newcomb Corner (Fig. 56).

Description

This is a grey, very hard, compact, slightly fossiliferous, slightly metamorphosed, Windsor Group limestone. The bedding appears to be massive with a light brown, smooth, weathered surface. It contains some clusters of calcite crystals. The only fossils noted are small brachiopods. There is no indication as to the strike and dip because of the small areal extent of the outcrop.

Although there is very little overburden, no indication of thickness or areal extent could be found. The area is hilly and heavily wooded away from the road.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-8-1	42.50%	3.19%	0.87%	51.40%	1.60%

MIDDLE MUSQUODOBOIT (Mo-9-1)

Outcrops of this occurrence are located at Murchyville on Little River, 5 km south of Middle Musquodoboit. The dolomite outcrops on the western side of Little River, 132.3 m upstream from the Middle Musquodoboit-Shaw Big Lake road. The dolomite forms the bank of Little River and outcrops along this bank for a distance of 96.6 m (Fig. 45).

Description

The occurrence is hard, brown, massive, fossiliferous, Windsor Group dolomite (Fig. 57). The bedding is very poorly developed with a light brown, smooth, weathered surface. There are numerous fossil cavities, some filled, others partially filled, with calcite. Some calcite veins are present. The fossils found are brachiopods and gastropods.

The strike and dip could not be determined because of the massive nature of the dolomite. Sedimentary rocks downstream, however, are striking east-west and dipping 7° south.

Overburden, over the dolomite, appears to be no more than 4.6 m. There is no indication as to the thickness of the dolomite. The dolomite is resting unconformably on steeply dipping Meguma Group rocks which outcrop on the eastern side of Little River. The surrounding area is open and easily accessible.

Figure 57. Outcrop of massive, fossiliferous Windsor Group dolomite found on Little River near Murchyville, Middle Musquodoboit area, Halifax County (Mo-9-1).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-9-1	44.85%	1.73%	4.75%	30.70%	17.75%

MIDDLE MUSQUODOBOIT (Mo-9-2)

This occurrence is located on Little River at Murchyville approximately 5 km south of Middle Musquodoboit. Dolomite outcrops on the northern side of the River, 158.5 m downstream from the bridge on the Middle Musquodoboit-Shaw Big Lake road. The dolomite lies unconformably on the underlying Meguma Group rocks. The contact more or less follows the Little River at Murchyville. This dolomite is a continuation of Mo-9-1 which outcrops upstream from the bridge (Fig. 45).

Description

The occurrence is dark grey, hard, massive, slightly fossiliferous, Windsor Group dolomite. The bedding is very poorly developed with a light brown, smooth, weathered surface. A few brachiopods and gastropods were the only fossils noticed. Some cigar sized and shaped structures were also noticed (burrows?). The dolomite contains some cavities, some filled, and others partially filled, with calcite.

The strike and dip could not be measured because of the massive nature of the dolomite. It does, however, appear to be trending N 60° E along the Meguma-Windsor contact.

There is no indication as to the thickness. Overburden is at least 3-4.6 m thick. The surrounding area is open and accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-9-2	44.95%	1.48%	5.60%	30.05%	17.70%

MIDDLE MUSQUODOBOIT (Mo-10-1) (DIAMOND DRILLING)

This occurrence is located behind an abandoned farm on the side of Little River at Murchyville. This farm is approximately 548.6 m down the River from the bridge on the Middle Musquodoboit-Shaw Big Lake road. The farm is 0.32 km west of the Middle Musquodoboit-Shaw Big Lake road. It outcrops behind the foundation of the house, in the apple trees (Fig. 45).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Middle Musquodoboit (Murchyville) area.

Description

The occurrence is dark grey, hard, massive, Windsor Group dolomite. The bedding is very poorly developed with a rough, dark brown, weathered surface. It contains a few small cavities containing calcite. The dolomite is slightly arenaceous. There is no indication as to the strike or dip.

There is no indication as to the thickness of the dolomite. The overburden covering is very slight because the dolomite outcrops in the field. This occurrence is an extension of Mo-9-1 and Mo-9-2 along the Meguma-Windsor contact. The surrounding area is open and easily accessible.

Down Little River from this dolomite occurrence, large limestone boulders were found containing Gigantoproductus, indicative of the Musquodoboit limestone (C Subzone). In the vicinity of Mo-10-1, a stromatolitic limestone is found outcropping in Little River (Fig. 58).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-10-1	44.90%	2.40%	6.20%	29.65%	16.90%

MIDDLE MUSQUODOBOIT (Mo-11-1) (Mo-21-1) (DIAMOND DRILLING)

This occurrence is located approximately 1.6 km southeast of Brookvale off the White Road. The area is 5 km southeast of Middle Musquodoboit. The dolomite outcrops on an abandoned farm, 0.8 km east of the White Road. Dolomite can be found outcropping around the farmhouse and in the

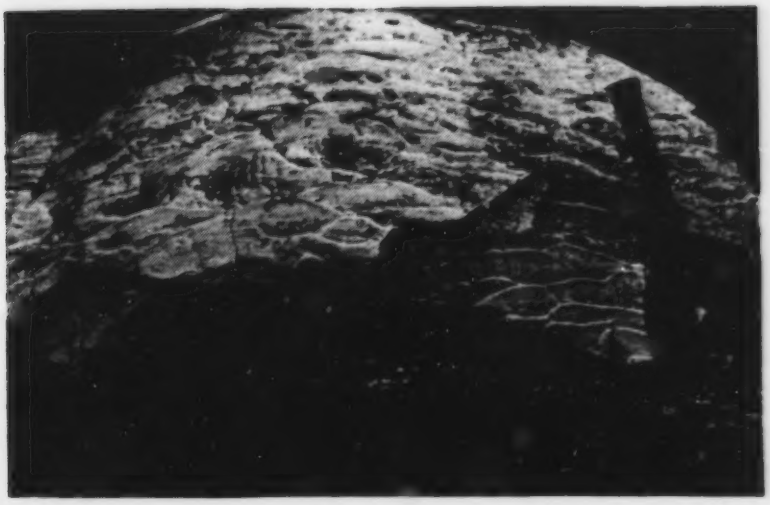


Figure 58. Stromatolitic limestone (Meaghers Grant Formation Windsor Group) found along the Little River near Murchyville, Middle Musquodoboit area, Halifax County (Mo-10-1).

field surrounding the house. On the western and northwestern side of the house, a 7.6-9 m embankment is found with dolomite outcropping in this bank in various locations from top to bottom (Fig. 56).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Middle Musquodoboit (Brookvale) area.

Description

Mo-11-1

The occurrence is greyish-brown, hard, massive, fossiliferous, Windsor Group dolomite. The bedding is very poorly developed with a dark brown, rough, weathered surface. The fossils are not abundant and the only type found is brachiopods. There are numerous cavities throughout, some fossil cavities. Some of these cavities are filled or partially filled with calcite, although calcite is not very abundant. The strike and dip could not be measured, although it appears to be trending N 80° E.

There is no indication as to the thickness of the dolomite. There appears to be little or no overburden covering the dolomite. The dolomite is very near the Meguma-Windsor contact. The surrounding area is open farmland and is easily accessible. This deposit appears to be quite extensive.

Mo-21-1

This belongs to the same occurrence as above, but is found in a small brook to the northwest of the abandoned farmhouse. The dolomite outcrops along both sides of the brook and forms 6.7 m high banks along the brook. This sample is a 6.7 m channel sample.

The dolomite appears to form an anticlinal structure with sandstone overlying the dolomite up and down the brook. This anticline strikes away from the brook in both directions and forms a 12 m high mound.

The dolomite is hard, massive, brown, fossiliferous, B Subzone Windsor Group. The fossils found are brachiopods and gastropods.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-11-1	45.95%	0.80%	3.77%	31.05%	18.85%
Mo-21-1	46.05%	1.75%	2.72%	29.95%	19.20%

MIDDLE MUSQUODOBOIT (Mo-12-1) (DIAMOND DRILLING)

This occurrence is located east of the White Road, approximately 1.6 km southeast of Brookvale and 5 km southeast of Middle Musquodoboit. This dolomite is found in the vicinity of Mo-11-1 and is found outcropping along the farm road which runs to the abandoned farmhouse around which Mo-11-1 dolomite was found. This area is 335.3 m south of Mo-11-1 along the farm road and outcrops in mounds in the field and in clumps of bushes and trees along the old farm road (Fig. 56).

See Chapter 4 and Appendix 1 for information concerning diamond drilling and chemical analyses in the Middle Musquodoboit area.

Description

The occurrence is greyish-brown, hard, massive, fossiliferous, Windsor Group dolomite (Fig. 59). The dolomite is identical to that found at Mo-11-1 and is probably an isolated occurrence sitting on or near the Meguma contact. The bedding is poorly developed with a dark brown, rough, weathered surface. There are numerous cavities throughout the dolomite, some partially filled with calcite. The fossils found are brachiopods and are not abundant. The strike is east and the dip is 35° south.

There is no indication as to the thickness, but the dolomite can be seen outcropping in various locations for a distance of 198 m along the farm road which runs diagonally across the strike. There is little or no overburden. The area is open farm land and is easily accessible.

Figure 59. Massive, fossiliferous dolomite found south of Brookvale, Middle Musquodoboit area, Halifax County (Mo-12-1).

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-12-1	45.40%	3.05%	4.0%	30.40%	17.80%

MIDDLE MUSQUODOBOIT (Mo-13) (FLOAT)

This limestone can be found as float approximately 1.6 km east of Centre Musquodoboit on the southeastern side of the Musquodoboit River. Limestone is found in a small brook 0.4 km east of where Henry Brook empties into the Musquodoboit River. The area can be reached by a dead end road which runs northeast from Newcomb Corner to Fraser Lakes. The limestone is found in an old field which has grown over. The limestone float is found 30.5 m north of the foundation of an old house (Fig. 56).

Description

This float ranges from a very hard, grey, compact, lithographic, slightly oolitic limestone to a thinly bedded, grey, hard, Windsor Group limestone. The lithographic limestone has a light brown, smooth, weathered surface. Very little calcite or cavities are found in the limestone.

There is no indication as to the thickness or the overburden depth, but the float can be found in great abundance in the soil on the side of the brook. The surrounding area is bush covered, but easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-13	41.05%	5.50%	15.80%	51.05%	0.70%

MIDDLE MUSQUODOBOIT (Mo-14-1)

This occurrence is located 4 km south of Middle Musquodoboit on the Middle Musquodoboit-Murchyville road. The dolomite outcrops in the road and under a farmhouse. This farm is 2.1 km north of the bridge at Murchyville. The dolomite outcrops on the road, on the front lawn and in the barn yard, and appears to be in a mound trending perpendicular to the road (Fig. 45).

Description

The occurrence is greyish-brown, hard, dense, Windsor Group dolomite. The weathered surface is dark brown and smooth. Very few cavities are present with very little secondary calcite. No fossils were found. This dolomite belongs to the Upper Windsor Group.

There is no indication as to the dip and strike because of the small areal exposures. The dolomite, however, is in a mound which strikes N 55° E. There is no indication as to the thickness or areal extent of the dolomite. The overburden is only slight with the dolomite outcropping in several places in this area. The area is open farmland and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-14-1	45.30%	1.98%	1.92%	34.20%	16.55%

MIDDLE MUSQUODOBOIT (Mo-15-1)

This occurrence is located 2.6 km southeast of Middle Musquodoboit on the South Section-Brookvale road. The limestone only outcrops along the northern ditch of this road and only a small exposure was found. This occurrence is 2.66 km west of the Brookvale intersection. There is a large amount of limestone float in the surrounding area, but no outcrop (Fig. 45).

Description

The occurrence is dark brown, hard, dense, thinly bedded, arenaceous, Windsor Group limestone. The bedding is well developed with a dark brown, smooth, weathered surface. There are very few cavities and no secondary calcite. This is Upper Windsor Group limestone. It appears to be striking N 50° E and dipping 31° SE.

There is no indication as to the thickness, areal extent or depth of overburden over the limestone because of the limited areal exposure. The surrounding area is open fields and rolling hills. Most of the hills appear to be of glacial origin. The area is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-15-1	37.25%	14.04%	8.05%	36.70%	3.30%

MIDDLE MUSQUODOBOIT (Mo-16-1)

Outcrops of this occurrence are located 1.6 km south of Middle Musquodoboit along the southern bank of the Musquodoboit River. The limestone outcrops along the top of a 7.6 m embankment, 30.5 m east of where the Canadian National Railway crosses the Musquodoboit River. Limestone can be found in the bank of the River, 4.6 m up from the water (Fig. 45).

Description

The occurrence is brown, hard, slightly porous, medium grained, slightly arenaceous, Windsor Group limestone. The bedding is poorly developed and crumbly with a brown, smooth, weathered surface. The limestone contains numerous cavities with no calcite infilling. Underlying the limestone is a red siltstone which outcrops at the edge of the Musquodoboit River. The siltstone contains a large amount of calcite.

The limestone appears to be flat lying with maybe a slight dip towards the north and out into the River. The limestone is only 3 m thick with possibly 1.5 m of overburden. The surrounding area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-16-1	43.25%	4.60%	1.57%	47.20%	3.81%

MIDDLE MUSQUODOBOIT (Mo-17-1)

This occurrence is located 1.6 km east of Middle Musquodoboit on a small brook which runs into the eastern side of the Musquodoboit River near the hospital. The limestone outcrops on the western bank of the brook, 304.8 m north of the Middle Musquodoboit-Brookvale road. Outcrops are found at the base of a 6 m embankment and limestone can be found along the side of the brook for a distance of 91.4 m (Fig. 45).

Description

The occurrence is brown, hard, dense, arenaceous, dolomitic, Upper Windsor Group limestone. The bedding is well developed with a light brown, smooth, weathered surface. No fossils were found. It is flat lying.

The limestone is approximately 3 m thick with 6-9.1 m of overburden. The limestone is underlain by a calcareous, light brown sandstone. A diamond-drill hole was put down in this area for clay and struck limestone after penetrating 12.2 m of cover (Wright, 1969). The area is partly wooded and hilly and is easily accessible. The limestone is of no economic value.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-17-1	40.75%	9.54%	5.82%	30.90%	13.20%

MIDDLE MUSQUODOBOIT (Mo-18-1)

Limestone of this occurrence can be found outcropping approximately 6 km southwest of Middle Musquodoboit, along the sides of the Canadian National Railway tracks. This area is along the Back Road Elderbank and is approximately 3 km northeast of Elderbank. Limestone can be found outcropping along the tracks, 160 m southwest of the second railway crossing from Elderbank. The limestone can be found for a distance of 38.1 m along the tracks (Figs. 45 and 46).

Description

This is a greyish-brown, hard, dense, fossiliferous, dolomitic, E Subzone, Windsor Group limestone. The bedding is well developed with a grey, rough, weathered surface. The fossils protrude from the weathered surface and consist of brachiopods, mainly *Gigantoproductus*. There are some cavities and veins containing small calcite crystals. It strikes N 45° E and dips 38° SE.

There is no indication as to thickness or areal extent. This occurrence, however, is very similar to Mo-2-1 which has only a thin covering of limestone with dolomite underneath. The cover over this limestone is slight. The area is open and easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-18-1	42.40%	5.20%	3.60%	34.15%	13.75%

MIDDLE MUSQUODOBOIT (Mo-19-1)

This occurrence of limestone is located approximately 2.4 km north of Elderbank and 7 km southwest of Middle Musquodoboit. This limestone is found along the eastern ditch of the Elderbank-Middle Musquodoboit road (Route 357), 0.48 km north of the turnoff to Chaswood which is 1.6 km north of Elderbank. There is limestone rubble for 30.5 m along the ditch with no visible outcrop (Fig. 46).

Description

The limestone ranges from dark grey, hard, dense, fossiliferous, C Subzone, Windsor Group limestone on top (possibly top 1.5 m) to brown, hard, slightly porous, Windsor Group dolomite below. From the rubble found, the bedding appears to be well developed with a smooth, weathered surface. The limestone contains brachiopods (*Gigantoproductus*) and corals (*Lithostrotion*). The corals are flat lying with their long direction parallel to the bedding. The underlying dolomite contains calcite veins with small crystals of calcite. This Upper Windsor Group section is similar to that found at Mo-2-1 and Mo-18-1 (Fig. 45). There is no indication as to the strike or dip, but it is probably flat lying.

There is no indication as to the thickness of the section or areal extent. The overburden appears to be no more than 1.5 m thick. The surrounding area is open farmland.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-19-1	41.50%	6.25%	1.90%	44.80%	5.30%

MIDDLE MUSQUODOBOIT (Mo-20-1)

This occurrence is located approximately 1.6 km northwest of Middle Musquodoboit. The dolomite occurrence is beside the dump road which runs around to Glenmore. The dolomite does not outcrop, but can be found as float in a small brook on the Winfred McFetridge property. The dolomite is on the southeastern side of the road, approximately 152.4 m west of the McFetridge barn. Dolomite can be found in a small pit which was used at one time for quarrying dolomite for the fields (Fig. 45).

Description

The occurrence is hard, brown, slightly porous, slightly fossiliferous, Windsor Group dolomite. No bedding can be distinguished because of the lack of outcrop. The weathered surface is dark brown and smooth. Small pieces of crinoid stems can be seen on the weathered surface. These were the only fossils found. Numerous small cavities are found throughout giving the porous nature to the rock. The strike and dip could not be measured.

The areal extent and depth of overburden could not be determined. The surrounding area is partly wooded and partly open pastureland and is accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
Mo-20-1	43.65%	6.35%	3.01%	28.45%	18.35%

UPPER MUSQUODOBOIT AREA

Mosher Limestone Company Limited have operated quarries and a dolomitic limestone processing facility at Upper Musquodoboit that has supplied aglime products to the Maritime region for more than 50 years (Fig. 60). Carbonate buildups of the Gays River Formation of the Lower Windsor Group (A Subzone) have been the primary source of dolomitic limestone. A series of quarries have been operated in a large carbonate bank complex occurring over a distance of several kilometres northeast of Route 224 along the southern border of the Musquodoboit Valley near Upper Musquodoboit. The geology of these carbonates, including the contact relationships with the underlying Meguma Group basement, is well exposed in these quarries (Figs. 61, 62 and 63). Carbonate buildups of the Gays River Formation are scattered around the perimeter of the Musquodoboit Valley from Gays River (host to Pb-Zn deposit) to Meaghers Grant and Upper Musquodoboit.

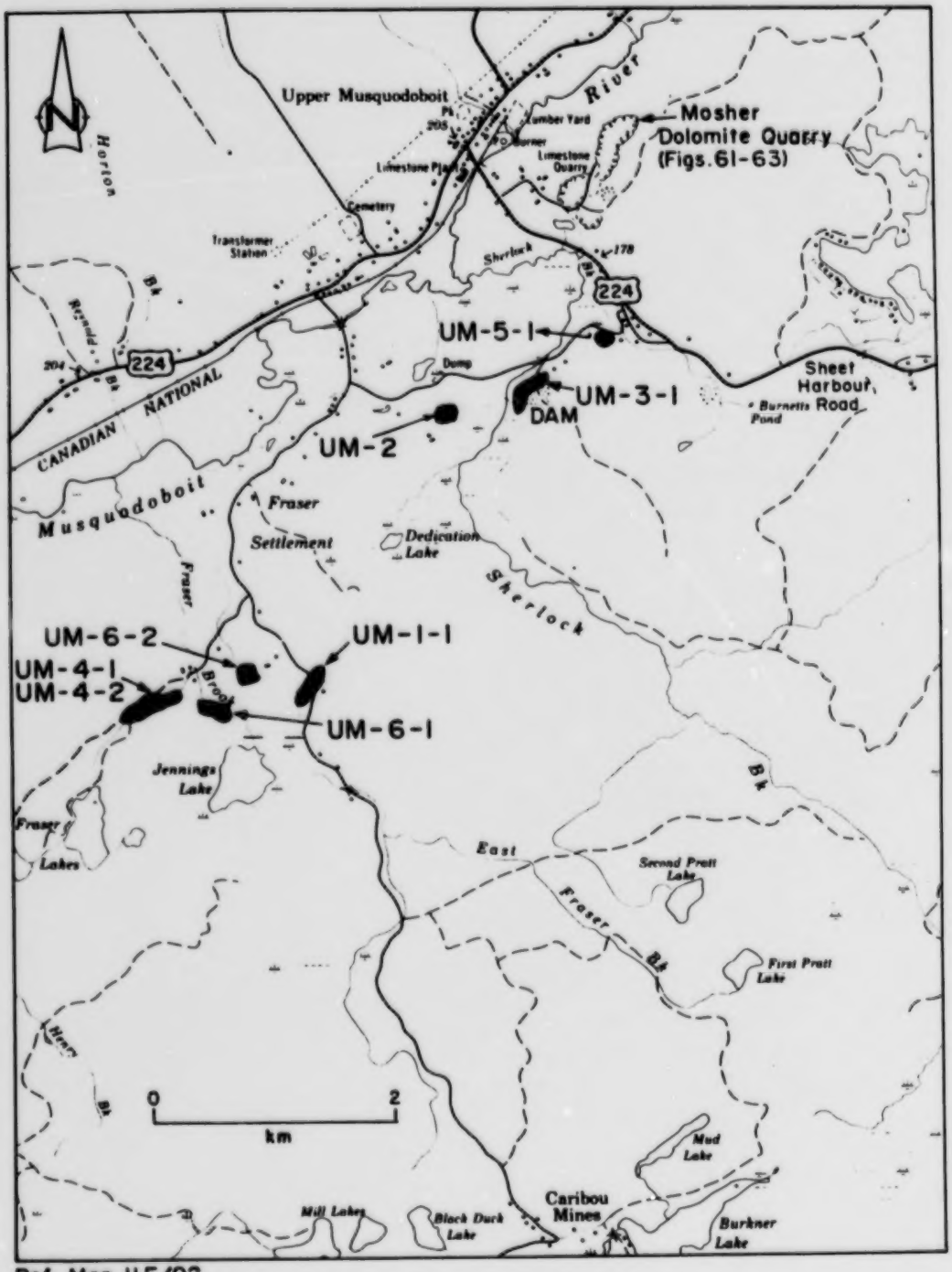
UPPER MUSQUODOBOIT (UM-1-1)

This occurrence is located 4.8 km south of Upper Musquodoboit along the road running from Upper Musquodoboit to Caribou Mines. This occurrence consists of dolomite which outcrops along the eastern side of the road, crosses the road and outcrops on the western side. The dolomite forms a mound which is approximately 24.4 m across at the summit. This area is 1.1 km south of the intersection at Fraser Settlement (Fig. 60).

Description

The occurrence is greyish-brown, very hard, dense, thinly bedded, Windsor Group dolomite. The weathered surface is light brown with a rough, pitted surface (typical dolomite weathering). There are some calcite stringers, not greater than 2.5 cm in thickness. It contains some detrital material probably from the Meguma Group. It strikes N 33° E and dips 21° NW.

The dolomite is found in a mound trending in the same direction as the strike, and can be traced for a distance of 243.8 m. There is no indication as to what is overlying or underlying the dolomite, although a large amount of quartzite float can be found below the dolomite.



Ref. Map 11E/02

Figure 60. Location map of limestone and dolomite occurrences sampled in the Upper Musquodoboit area, Halifax County (11E/02).

Figure 61. Dolomite can be seen overlapping quartzite in the Upper Musquodoboit dolomite quarry, Halifax County. For location see Figure 60.

Figure 62. Closeup of Goldenville-Windsor contact in quarry shown in Figure 61, Upper Musquodoboit, Halifax County.

Figure 63. Massive dolomite found in the quarry at Upper Musquodoboit, Halifax County. For location see Figure 60.

The overburden is only slight with dolomite outcropping on the surface. The dolomite is approximately 9 m thick. The surrounding area is open on the western side of the road and heavily wooded with spruce on the eastern side.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
UM-1-1	43.30%	7.85%	2.27%	28.50%	17.35%

UPPER MUSQUODOBOIT (UM-2) (FLOAT)

This occurrence is located approximately 2.4 km south of Upper Musquodoboit and 1.3 km east of Fraser Settlement. This dolomite does not outcrop, but a large amount of float can be found. The dolomite float is found 243.8 m south of the road running from Fraser Settlement to Sheet Harbour Road. Float is found in a mound with an elevation of 76.2 m. This is south of the farmhouse of Elmer Stewart (Fig. 60).

Description

This occurrence is brownish-grey, hard, slightly porous, fossiliferous, A Subzone, Windsor Group dolomite. The weathered surface is pitted and light brown. It contains a large amount of secondary calcite filling some of the cavities. Associated with the calcite is galena as small crystals. The fossils found are gastropods and these are only found as moulds.

There is no indication as to the thickness or the amount of overburden. The surrounding area is open pastureland and is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
UM-2	47.40%	0.48%	0.84%	31.20%	20.10%

UPPER MUSQUODOBOIT (UM-3-1)

This occurrence is located 2.4 km south of Upper Musquodoboit and can be found outcropping along the southeastern side of Sherlock Brook, above and below the dam. The dolomite outcrops along the eastern side of the lake above the dam and runs parallel to Sherlock Brook almost to the Fraser Settlement-Sheet Harbour Road (Fig. 60).

Description

The occurrence is brownish-grey, porous, massive, fossiliferous, B Subzone, Windsor Group dolomite. It contains numerous cavities, some filled and others partially filled with calcite. The bedding is poorly developed with a rough, pitted, weathered surface. Most of the fossils have been destroyed by dolomitization, but a few casts and moulds still remain. The fossils are gastropods and brachiopods. The rock contains a large amount of calcite. It strikes east and dips 8° S.

Several trenches were dug in this area to test the dolomite for agricultural stone. These trenches show the dolomite to be at least 4.6 m thick with the overburden varying between 3-4.6 m. The surrounding area is wooded, but easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
UM-3-1	46.30%	1.45%	2.01%	30.40%	20.40%

UPPER MUSQUODOBOIT (UM-4-1) (UM-4-2)

This occurrence is located 5.3 km southwest of Upper Musquodoboit. The dolomite outcrops on the road between Fraser Settlement and Fraser Lakes and also outcrops on the sides and in Fraser Brook, 0.8 km north of where it empties into Fraser Lakes. Dolomite outcrops over a wide area in the fields and on the road. It can be traced along Fraser Brook for 457.2 m (Fig. 60).

Description

This occurrence consists of two types of dolomite. On top is UM-4-1, which is a light grey, siliceous, porous, medium grained, oolitic, Windsor Group dolomite. The weathered surface is smooth with poorly developed bedding. It contains a large amount of detrital material. Underlying UM-4-1 is UM-4-2 which is a light grey, very hard, compact, Windsor Group dolomite. The bedding is poorly developed with a smooth, light brown, weathered surface. This dolomite is close to the Windsor-Meguma contact. The dolomite is almost flat lying with a slight dip to the northeast.

This occurrence is at least 4.6 m thick with the overburden ranging from 3-4.6 m in thickness. The surrounding area consists of heavily wooded areas as well as open pastureland and is readily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
UM-4-1	42.10%	10.30%	2.58%	27.10%	17.35%
UM-4-2	45.20%	3.27%	2.90%	32.50%	15.30%

UPPER MUSQUODOBOIT (UM-5-1)

This occurrence is located on the Sheet Harbour Road-Fraser Settlement road, 0.64 km south of where this road joins the Upper Musquodoboit-Sheet Harbour Road road. This area is approximately 2 km southeast of Upper Musquodoboit. Limestone is found outcropping on the southern side of the road beside the house of Hector Gaul. The property has been cleared next to the house exposing the outcrop (Fig. 60).

Description

The occurrence is light grey, hard, dense, partially oolitic, massive, Windsor Group limestone. The bedding is very poorly developed with a rough, light grey, weathered surface. A few brachiopods can be found on the weathered surface, but none could be seen on a fresh surface. The dip and strike could not be measured because of the rubbly nature of the outcrop.

Although there is little or no overburden, the thickness could not be determined. The surrounding area is hilly and heavily wooded, but is easily accessible.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
UM-5-1	40.01%	5.60%	4.30%	49.70%	0.60%

UPPER MUSQUODOBOIT (UM-6-1) (UM-6-2)

This occurrence is located on Fraser Brook approximately 5.3 km southwest of Upper Musquodoboit. The dolomite outcrops in Fraser Brook (UM-6-1), approximately 335.3 m up the Brook from the Fraser Settlement-Fraser Lakes road. Dolomite outcrops in the upper 6 m of a 15.3 m cliff along the northern bank of Fraser Brook. Northeast of Fraser Brook, in a field, the dolomite is found as float with outcrops (UM-6-2) in a brook (Fig. 60).

Description

UM-6-1

The occurrence is greyish-brown, hard, massive, arenaceous, Windsor Group dolomite. The rock is very thickly bedded with a brown, rough, weathered surface. It contains some small calcite veins, as well as some slight fracturing more or less parallel with the bedding. It strikes N 80° E and dips 13° NW.

The dolomite is approximately 6 m thick with very little overburden.

The dolomite is underlain by a very arenaceous siltstone containing a large amount of mica (Fig. 64). This siltstone is very thinly bedded with some very thin (0.6-0.9 m) interbedded limestone.

The surrounding area is heavily wooded and hilly, and not easily accessible.

All of the dolomite on Fraser Brook is very near shore or fresh water dolomite with a large amount of detritus having been carried into the depositional area. These micaceous siltstones may possibly be the upper part of the Horton Group which is conformable with the Windsor Group.

UM-6-2

UM-6-2 is a continuation of occurrence UM-6-1. It outcrops in the brook located just northeast of Fraser Brook.

It is a greenish-brown, very hard, compact, massive, arenaceous, dolomitic, Windsor Group limestone. A large amount of secondary calcite is associated with the limestone. The bedding is poorly developed with a rough, brown, weathered surface.

This limestone covers a broad area because of the low dip. The limestone, however, is probably no thicker than 6-7.6 m with possibly 3-4.5 m of overburden.

Analysis

Sample	L.O.I.	SiO_2	R_2O_3	CaO	MgO
UM-6-1	45.95%	1.05%	2.50%	32.90%	17.3%
UM-6-2	44.60%	1.54%	1.27%	40.75%	11.0%

Figure 64. Dolomite outcropping on top of a micaceous siltstone found along Fraser Brook, southwest of Upper Musquodoboit, Halifax County (UM-6-1).

CHAPTER 4. DIAMOND DRILLING

Preliminary diamond drilling was carried out during the late 1960s in Colchester and Halifax Counties to further assess limestone and dolomite occurrences which were of particular interest.

Plans and sections are included in this Chapter which locate drillholes and detail the lithology. Appendix 1 includes the drill logs and analyses.

There has been significant drilling since this report was written. Some selected analyses from Levaque *et al.* (1988) have been included in Appendix 1.

Chapter 4 and Appendix 1 are not intended to be a comprehensive compilation of drilling completed in Colchester and Halifax Counties, but rather a compilation of the drilling completed by the author at the time of the study to help delineate prospective deposits.

COLCHESTER COUNTY

BEAVER BROOK AREA (BB-1-1, BB-2-1)

Lafarge Canada Inc. drilled six holes containing a combined thickness of 45.4 m limestone (Fig. 5) in the Beaver Brook area (Levaque *et al.*, 1988). They estimated a tonnage of 250 000 t of high calcium limestone approximately 11.6 m below the surface in a bed approximately 7.5 m thick.

Chemical analyses for two of these holes are given in Appendix 1.

BLACK ROCK AREA (BR-1-1)

Six holes totalling 185 m were drilled by Lafarge Canada Inc. in 1988 (Levaque *et al.*, 1988) (Fig. 5). The Macumber limestone is highly folded and dips steeply to the south. The mineable tonnage was estimated to be 78 000 t assuming an average thickness of 7.5 m and a width of 50 m (Levaque *et al.*, 1988).

Chemical analyses were done on samples from three of the drillholes. Average for each of these holes as well as the averages and standard deviations for the combined drillholes are given in Appendix 1.

HILDEN AREA (Hi-1-1) (Hi-1-2)

One drillhole was drilled at the Hilden occurrence south of Irwins Lake (Figs. 5, 65 and 66).

Approximately 10 m of dense, massive, very fossiliferous Windsor Group dolomite were drilled followed by approximately 5 m of hard Windsor Group anhydrite. The hole ended in anhydrite. There was <1 m of overburden. See Appendix 1 for the drill log and analyses.

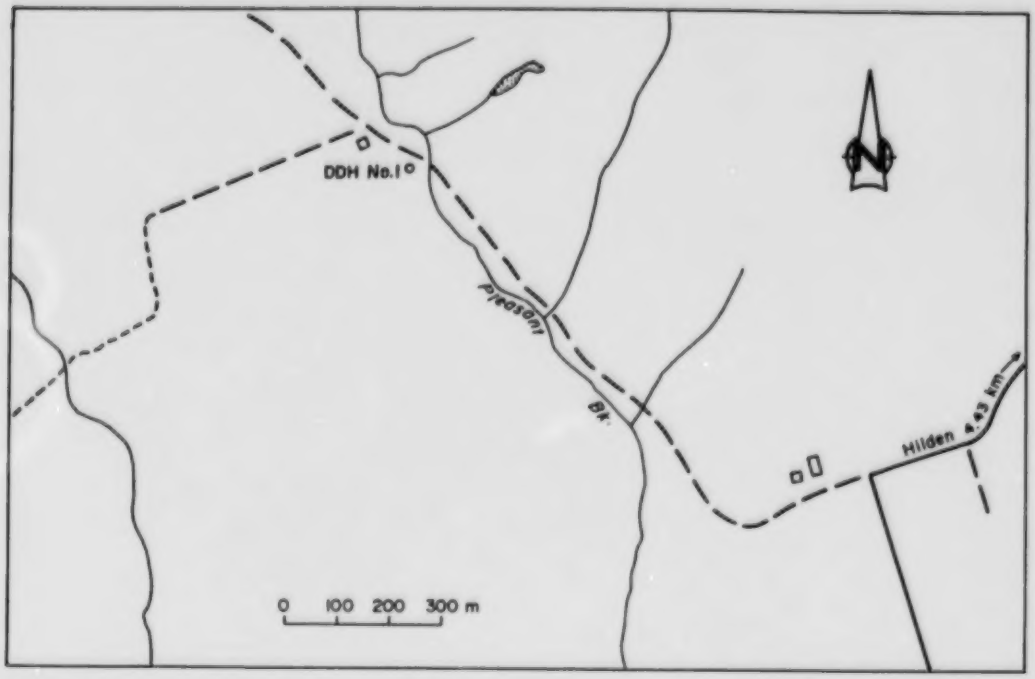


Figure 65. Location map for diamond-drill hole number 1, Hilden area, Colchester County (Fig. 5; Hi-1-1, Hi-1-2).

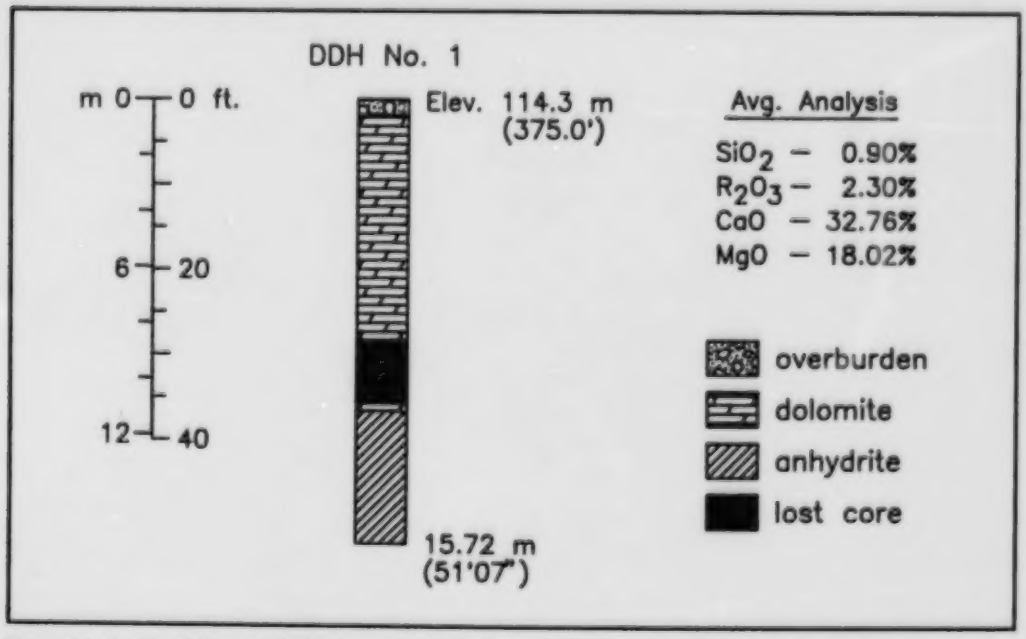


Figure 66. Profile of diamond-drill hole number 1, Hilden area, Colchester County, November 1968.

PEMBROKE RIVER AREA (Pb-6-1)

Two drillholes were put down to test a high-calcium limestone, low in silica and other impurities, in the vicinity of Glenbervie. The limestone horizon belongs to the B Subzone of the Windsor Group and is underlain by gypsum. It varies in colour from light to dark greyish, very hard and fossiliferous. The limestone is highly fractured and brecciated and holds blebs and seams of galena (Figs. 11, 67 and 68). See Appendix 1 for diamond-drill logs and analyses.

PENNY MOUNTAIN AREA (PM-2-1)

Lafarge Canada Inc. drilled 17 drillholes during 1984 and 1985 (Fig. 22). Conservative estimates of reserves from this drilling suggested approximately 500 000 t of high calcium limestone with little overburden (Lafrenière and Clark, 1986). See Appendix 1 for chemical analyses.

HALIFAX COUNTY

DOLLAR LAKE AREA (DL-1-1)

Four diamond-drill holes were completed to check the physical and chemical characteristics of the carbonate member of the Windsor Group in the vicinity of Dollar Lake (Figs. 44, 69 and 70). Two of the drillholes intersected limestone and dolomite. The dolomite is brownish in colour, hard, dense and belongs to the B Subzone. The basal part of the carbonate member is greyish in colour, very argillaceous and holds some small fragments of the underlying slate formation. Numerous thin seams of black carbonaceous material exist throughout the basal 1.5 m section. No bedding was observed and a few brachiopods occur in the dolomite. More drilling is justified to determine the extent of the dolomite in the vicinity of drillholes 1 and 2. The chemical analyses indicate a good quality dolomite rock. See Appendix 1 for diamond-drill logs and analyses.

GAYS RIVER AREA (COOKS BROOK) (GR-3-2)(GR-3-3)

Seven drillholes were completed to gain information on a dolomite deposit at Cooks Brook (Figs. 50 and 71-73). A possible 500 000 t of dolomite is indicated in this area by preliminary drilling. The deposit consists of a narrow band of dolomite stretching along the Windsor-Meguma contact for a distance of 609.6 m. It averages 30.5 m in width and is 9.1 m thick. The area is 11.3 km from the Canadian National Railway at Milford Station and should be easy to quarry. Chemical data are available for four of the drillholes. See Appendix 1 for diamond-drill logs and analyses.

MEAGHERS GRANT AREA (MG-5-1)

One drillhole was completed at occurrence MG-5-1 (Figs. 46, 74 and 75). There was 1.5 m of overburden, followed by 3 m of hard, dense, medium grained Windsor Group dolomite. The hole ended in Goldenville Formation quartzite (3 m). See Appendix 1 for the drill log.

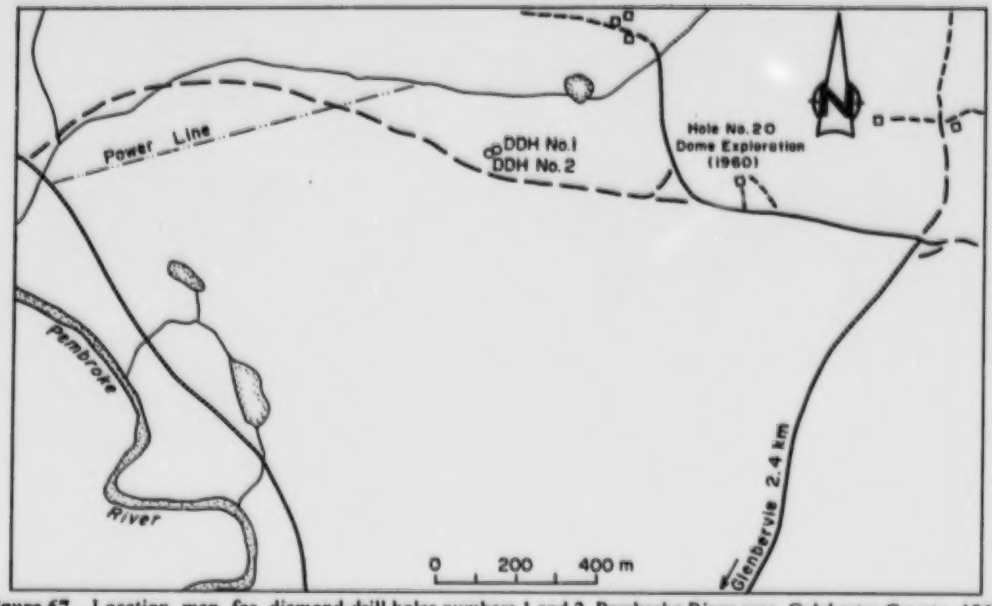


Figure 67. Location map for diamond-drill holes numbers 1 and 2, Pembroke River area, Colchester County, 1968 (Fig. 11; Pb-6-1).

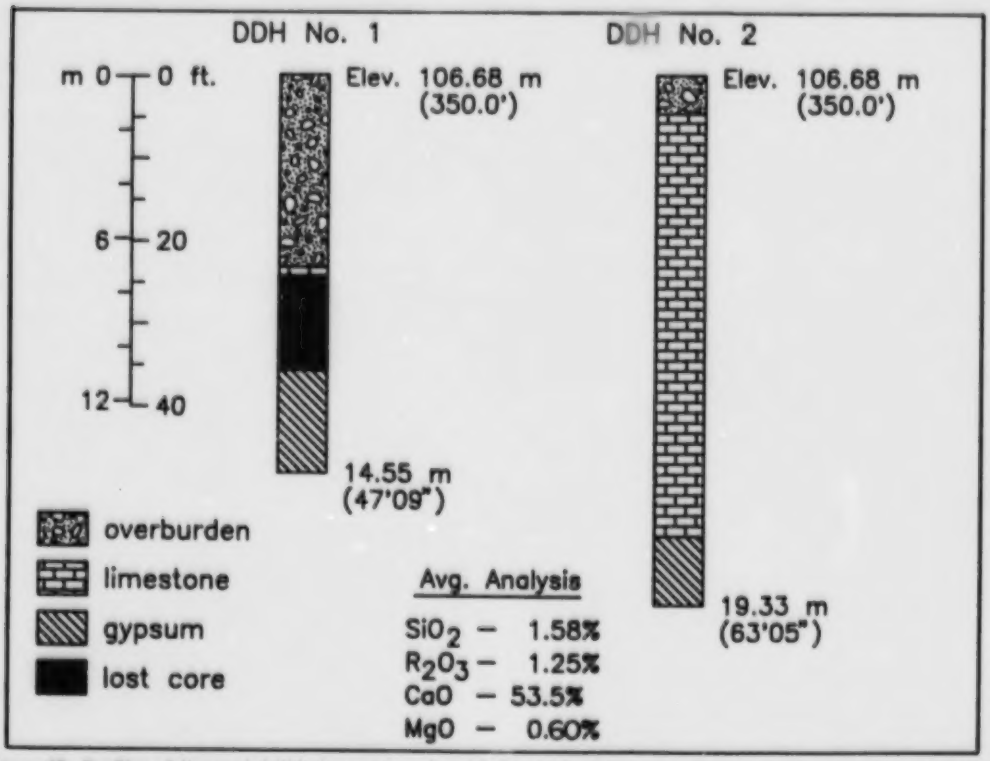


Figure 68. Profiles of diamond-drill holes numbers 1 and 2, Pembroke River area, Colchester County, November 1968.

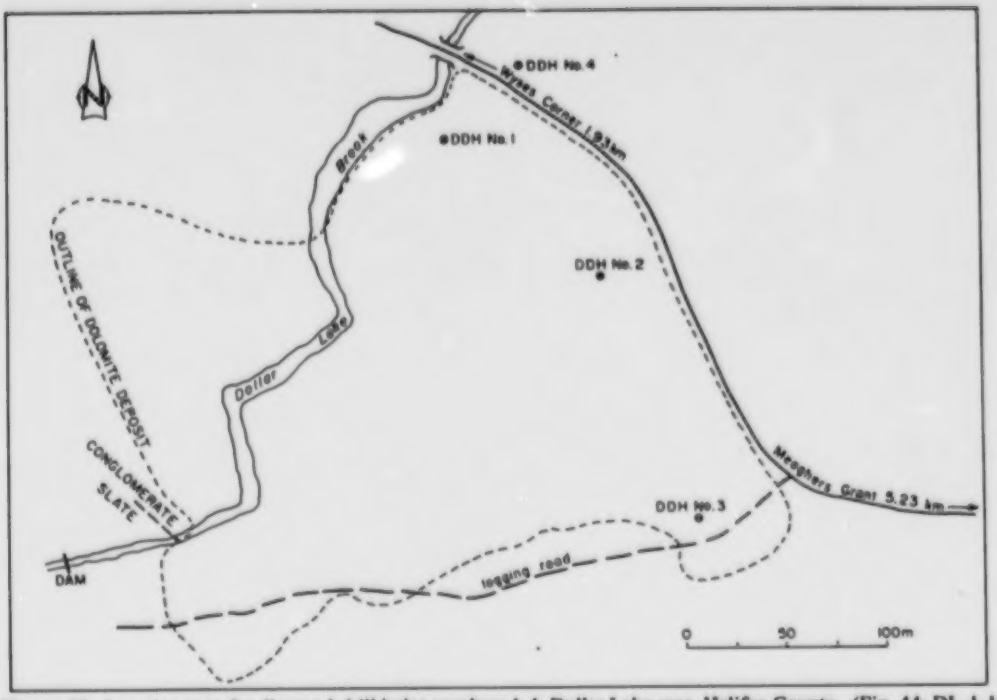


Figure 69. Location map for diamond-drill holes numbers 1-4, Dollar Lake area, Halifax County (Fig. 44; DL-1-1).

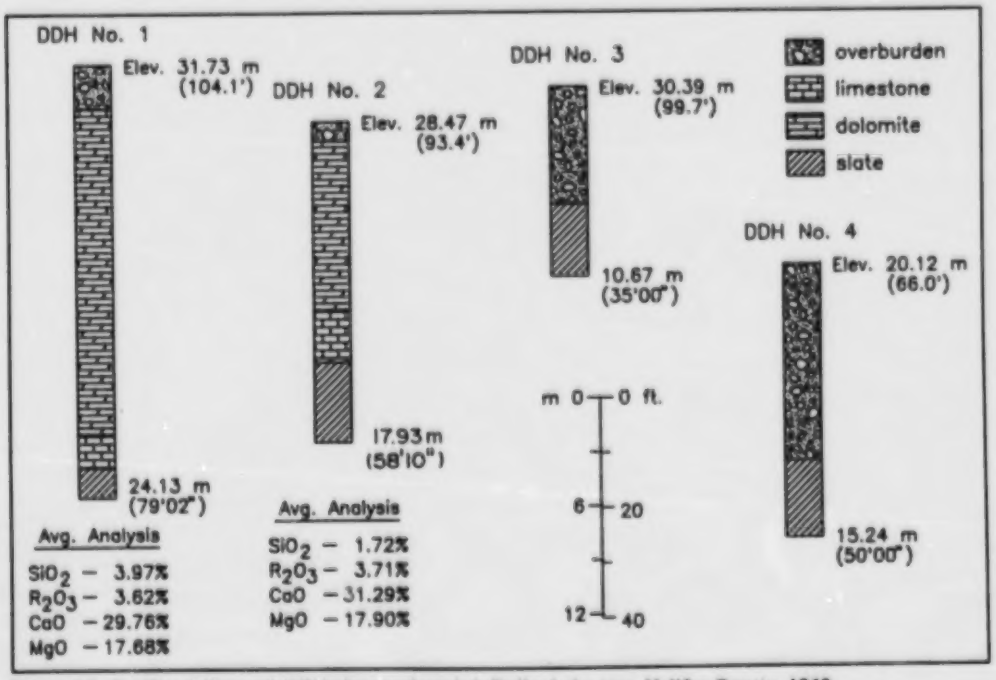


Figure 70. Profile of diamond-drill holes numbers 1-4, Dollar Lake area, Halifax County, 1968.

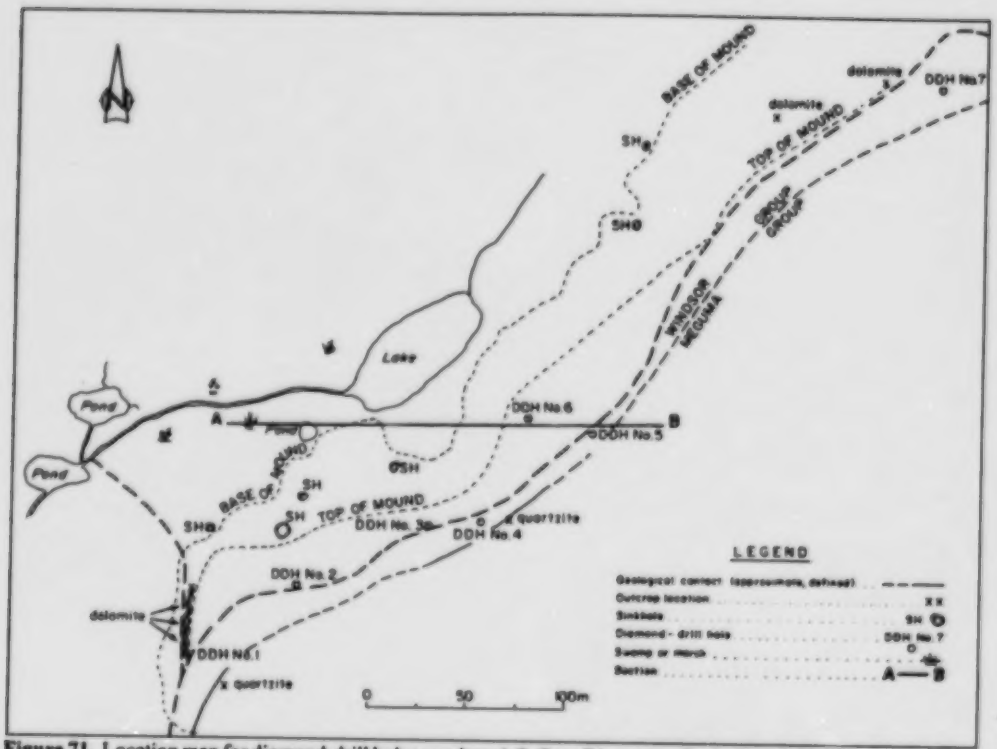


Figure 71. Location map for diamond-drill holes numbers 1-7, Gays River area, Cooks Brook, Halifax County, December 1969 (Fig. 50; GR-3-2, GR-3-3).

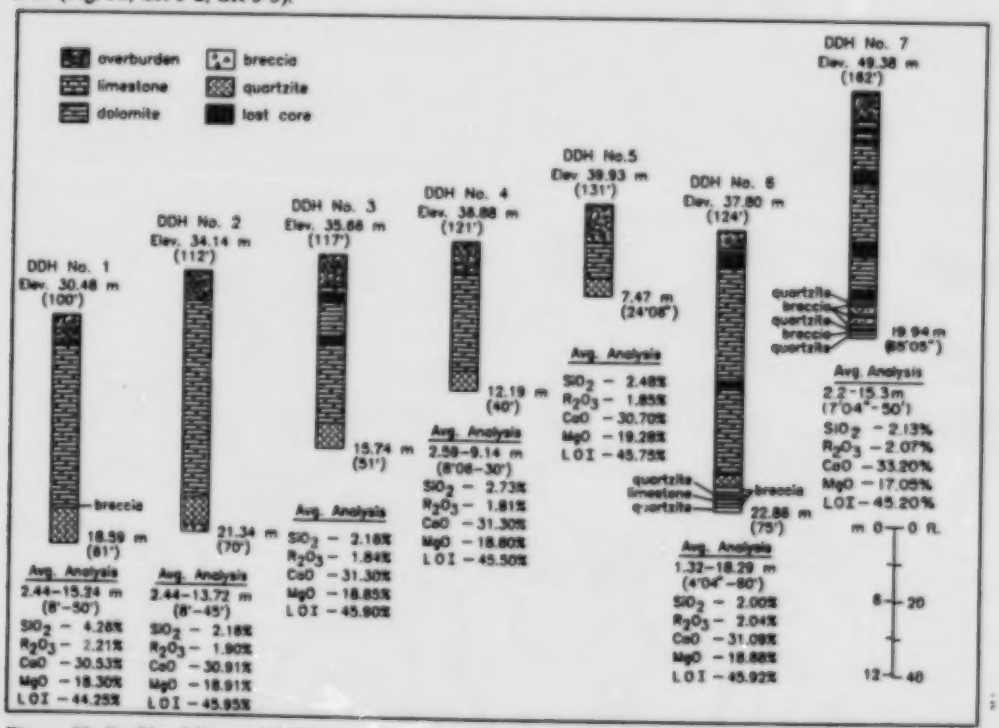


Figure 72. Profile of diamond-drill holes numbers 1-7, Gays River area, Cooks Brook, Halifax County, December 1969.

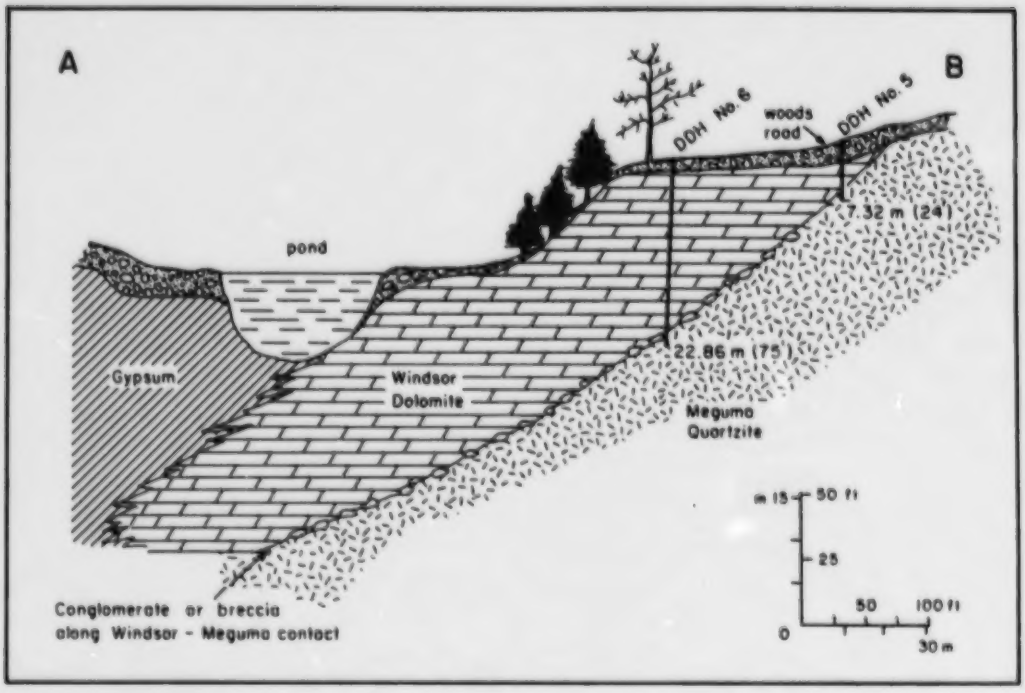


Figure 73. Section A-B, through drillholes 5 and 6, Gays River area, Cooks Brook, Halifax County.

MIDDLE MUSQUODOBOIT AREA (Mo-2-1)

The magnesium limestone intersected in the drillhole drilled in this area is brownish in colour, hard, slightly porous, medium grained and belongs to the Upper Windsor Group. It is siliceous with small bands of clayey and arenaceous material and is underlain by conglomerate (Figs. 45, 76 and 77). See Appendix 1 for diamond-drill log and analyses.

MIDDLE MUSQUODOBOIT AREA (MURCHYVILLE) (Mo-10-1)

The dolomite is good quality. It occurs as a narrow band along a ridge and is underlain by slate of the Halifax Formation (Figs. 45, 78 and 79). The areal extent of the deposit is not extensive and tonnage available is not sufficient for an economic operation. See Appendix 1 for diamond-drill logs and analyses.

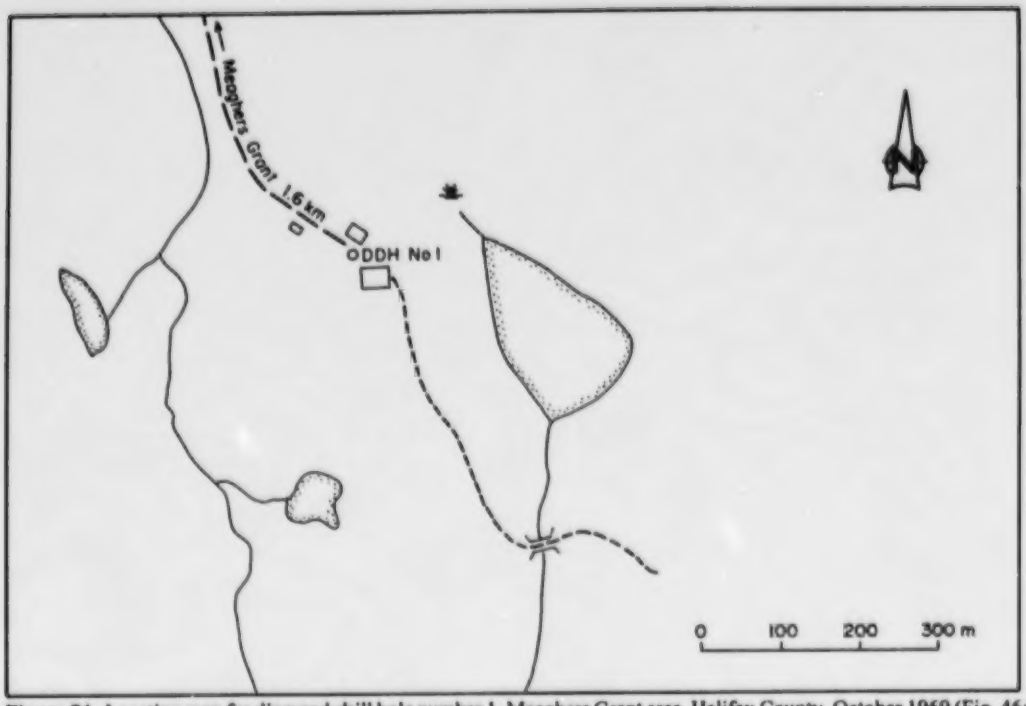


Figure 74. Location map for diamond-drill hole number 1, Meaghers Grant area, Halifax County, October 1969 (Fig. 46; MG-5-1).

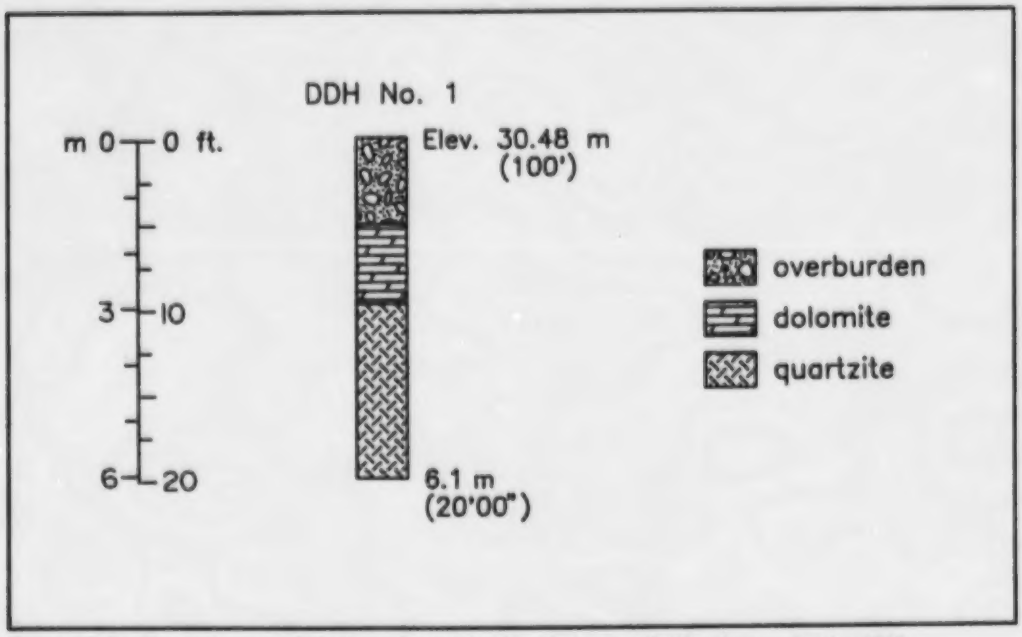


Figure 75. Profile of diamond-drill hole number 1, Meaghers Grant area, Halifax County, October 1969.

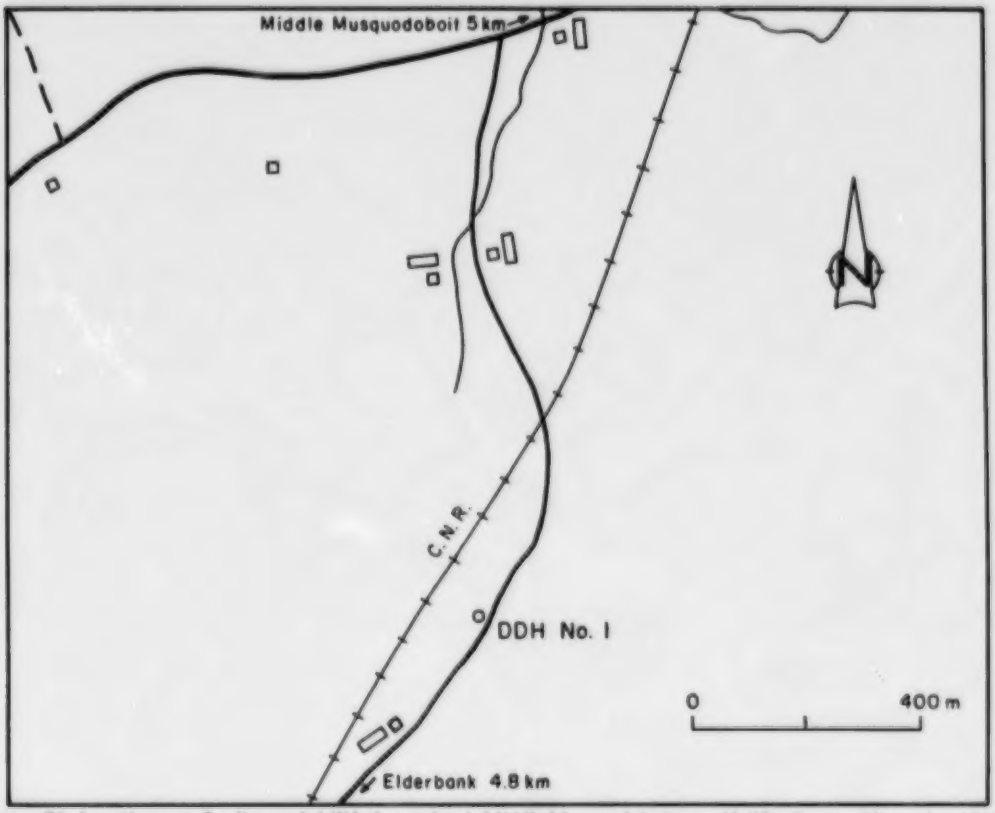


Figure 76. Location map for diamond-drill hole number 1, Middle Musquodoboit area, Halifax County, November 1968 (Fig. 45; Mo-2-1).

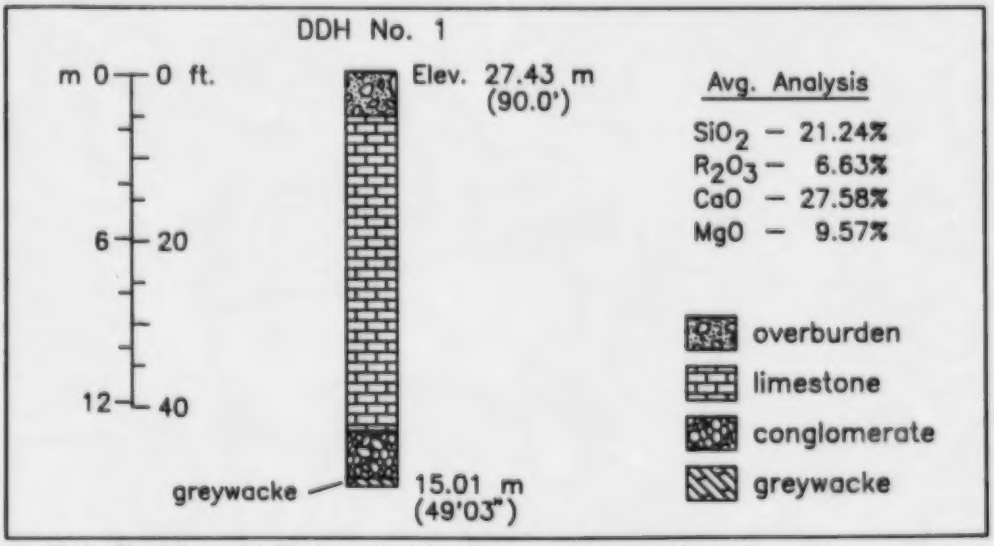


Figure 77. Profile of diamond-drill hole number 1, Middle Musquodoboit area, Halifax County, November 1968.

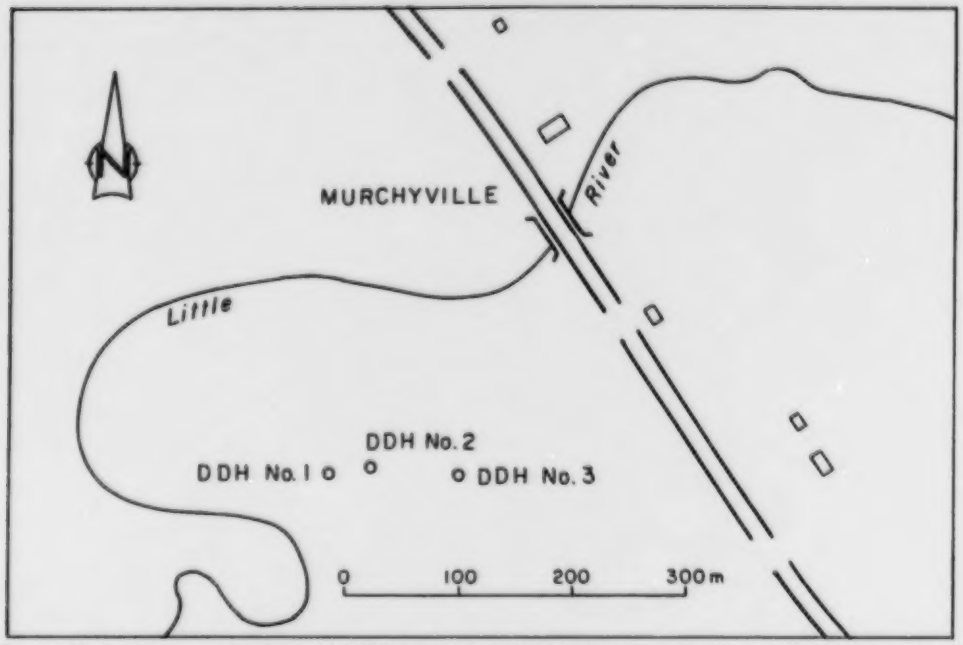


Figure 78. Location map for diamond-drill holes numbers 1-3, Middle Musquodoboit area, Murchyville, Halifax County, October 1969 (Fig. 45; Mo-10-1).

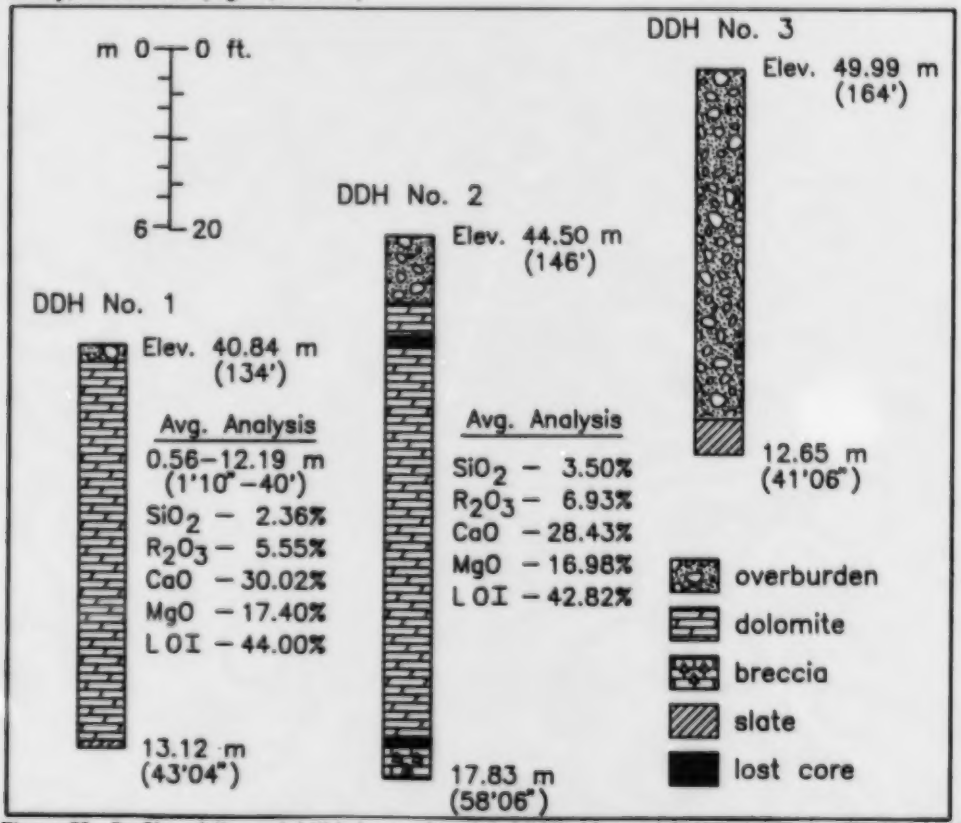


Figure 79. Profiles of diamond-drill holes numbers 1-3, Middle Musquodoboit area, Murchyville, Halifax County, October 1969.

MIDDLE MUSQUODOBOIT AREA (BROOKVALE) (Mo-11-1) (Mo-21-1) (Mo-12-1)

Seven holes were drilled to test a dolomite horizon southeast of Middle Musquodoboit (Figs. 56, 80 and 81). The dolomite covers an extensive area and in places a good thickness is indicated. The dolomite is of good quality and with additional drilling a large tonnage of high magnesium stone could no doubt be developed. See Appendix 1 for diamond-drill logs and analyses.

Four of the drillholes did not intersect dolomite. They were put down primarily to define the limits of the dolomite horizon and in no way detract from the possibilities of establishing a large tonnage of good quality dolomite in this area.

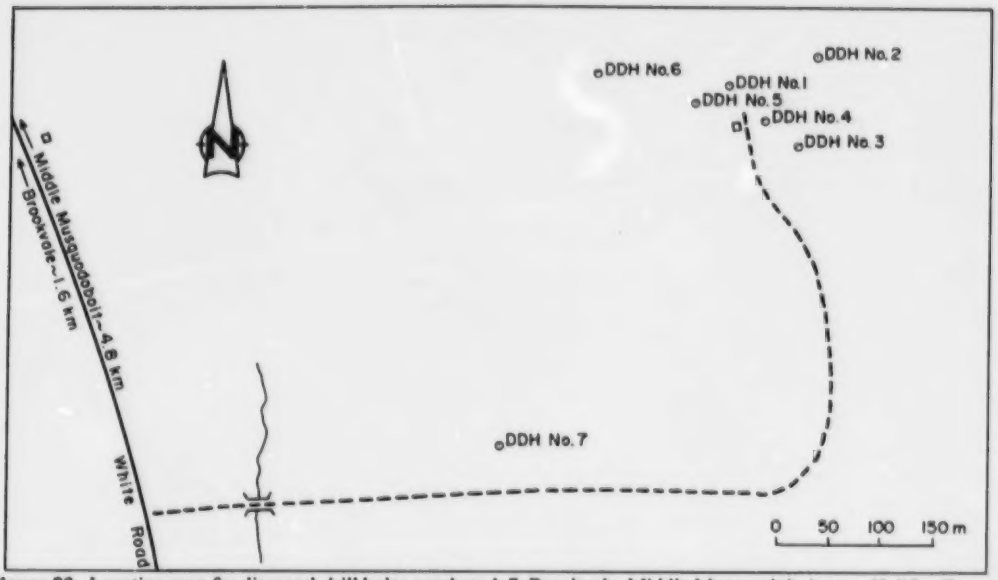


Figure 80. Location map for diamond-drill holes numbers 1-7, Brookvale, Middle Musquodoboit area, Halifax County, October 1969 (Fig. 56; Mo-11-1, Mo-21-1, Mo-12-1).

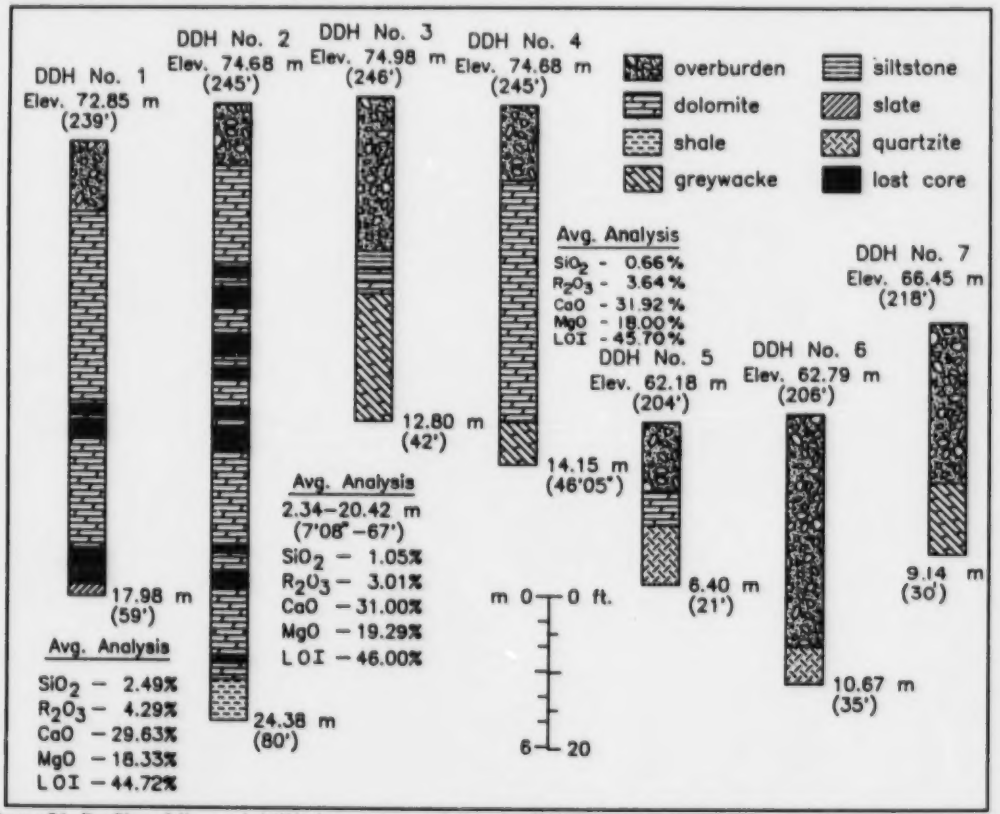


Figure 81. Profiles of diamond-drill holes numbers 1-7, Brookvale, Middle Musquodoboit area, Halifax County, October 1969.

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APPENDIX 1. DIAMOND-DRILL LOGS AND ANALYSES

COLCHESTER COUNTY

BEAVER BROOK AREA (BB-1-1, BB-2-1)*

Hole #	Depth (m)	Depth (ft.)	CaO	MgO	SiO_2	Na_2O	K_2O	Cl	Al_2O_3	Fe_2O_3	MnO	NaEq
1	11.9-19.5	39-64	53.82	0.30	2.68	0.05	0.07	0.020	0.41	0.37	0.25	0.09
2	11.3-18.9	37-62	48.50	0.40	10.74	0.05	0.23	0.006	1.54	0.76	0.33	0.20
Average			51.16	0.35	6.71	0.05	0.15	0.013	0.98	0.56	0.29	0.15
Standard Deviation			3.76	0.07	5.70	0.00	0.12	0.010	0.80	0.28	0.06	0.08
*after Levaque *et al.*, 1988												

COLCHESTER COUNTY

BLACK ROCK AREA (BR-1-1)*

Hole #	Depth (m)	Depth (ft.)	CaO	MgO	SiO_2	Na_2O	K_2O	Cl	Al_2O_3	Fe_2O_3	MnO	NaEq
1	6.4-13.7	21-45	48.48	0.99	6.23	0.05	0.31	0.025	1.30	1.50	0.22	0.25
4	6.1-10.4	20-34	36.14	1.52	22.14	0.21	0.99	0.010	4.60	4.19	0.32	0.86
5	15.2-24.4	50-80	50.58	0.38	6.83	0.05	0.36	0.016	1.53	1.07	0.13	0.29
Average			45.07	0.96	11.73	0.10	0.55	0.017	2.48	2.25	0.22	0.47
Standard Deviation			7.80	0.57	9.02	0.09	0.38	0.008	1.84	1.69	0.10	0.34
*after Levaque *et al.*, 1988												

COLCHESTER COUNTY

HILDEN AREA (IRWINS LAKE) (Hi-1-1) (Hi-1-2)

Hole Number: **1 (Hilden)**
Location: See Figures 5 and 65 for approximate location
Ultimate Depth: 15.7 m (51'07")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-0.6 (0'-2')	Overburden	
0.6-11 (2'-36'03")	Dolomite	Multicoloured, hard, dense, massive, very fossiliferous, Windsor Group dolomite, belonging to the B_1 Subzone (Bell, 1929). No bedding is shown. Fossils found include bryozoans, brachiopods, crinoid stems and cephalopods. The crinoid stems have been entirely replaced by black dolomite. Most of the cavities are fossil cavities, and are partially filled by calcite crystals. Contains a few seams of clay. There is a red iron staining throughout, surrounding some of the cavities. Generally, where crinoid stems are very abundant, there are no other fossils present. Becomes more argillaceous near the bottom of the dolomite.
11-15.7 (36'03"-51'07")	Anhydrite	Light grey and hard Windsor Group anhydrite

END OF HOLE

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Hi-1-1	0.6-1.5	(2-5)	0.70	2.19	33.70	17.50	-
Hi-1-2	1.5-3.1	(5-10)	0.85	2.40	33.70	16.95	-
Hi-1-3	3.1-4.6	(10-15)	0.84	2.11	32.00	18.95	-
Hi-1-4	4.6-6.1	(15-20)	1.30	2.50	33.30	17.50	-
Hi-1-5	6.1-7.6	(20-25)	0.85	2.32	31.10	19.20	-
Average Assay			0.90	2.30	32.76	18.02	-

COLCHESTER COUNTY

PEMBROKE RIVER AREA (Pb-6-1)

Hole Number: **1 (Pembroke River)**
Location: See Figures 11 and 67 for approximate location
Ultimate Depth: 14.6 m (47'09")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-7.0 (0'-23')	Overburden	(Limestone boulders).
7.0-7.3 (23'-24')	Limestone	Dark brown, slightly porous, siliceous, dolomitic, Windsor Group limestone. Contains some galena as thin, small veins. Also contains some small, white, thin, calcite veinlets.
7.3-10.7 (24'-35')	Lost core	(Cavity).
10.7-14.6 (35'-47'09")	Gypsum	White, soft, with numerous black, argillaceous bands. Core is dipping approximately 60°. A few thin bands of satin spar at 10.7 m (35').
		END OF HOLE

Hole Number: **2 (Pembroke River)**
Location: Lat.: 45°17'06", Long.: 62°56'24"
Ultimate Depth: 19.3 m (63'05")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-1.5 (0'-5')	Overburden	
1.5-16.8 (5'-55'01")	Limestone	Varies from light grey to dark grey in colour, very hard, fossiliferous, massive, Windsor Group limestone belonging to the B_1 Subzone. Limestone is highly fractured and brecciated with much associated galena. There are numerous fossil cavities (mainly brachiopods) and numerous small calcite veins ranging up to 0.64 cm thick. These

veins and stringers of calcite have no definite orientation. Galena is found in small blebs throughout with seams of galena at various sections. Some of the cavities contain conate water along with some small calcite crystals. Some stylolites are present.

16.8-19.3 (55'01"-63'05") Gypsum

Banded, soft gypsum containing some bands of satin spar and some small, rounded fragments of anhydrite. The bands in the gypsum are formed by black carbonaceous gypsum. These bands form an angle of 70° (average) with the horizontal.

END OF HOLE

Special Notes:
- 5.79-5.81 m (19'-19'01") — Seam of galena.
- 6.6 m (21'07") — Seam of galena.
- 16.3 m (53'05") — Limestone becomes almost black and fine grained with numerous seams of black carbonaceous material.

Lost Core:
- 10.1-10.5 m (33'01"-34'06")
- 11.4-13.3 m (37'05"-43'08") — Cavities.
- 13.7-16.3 m (45'-53'05")

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Pb-2-1	1.5-3.1	(5-10)	0.97	1.05	53.70	0.78	42.95
Pb-2-2	3.1-4.6	(10-15)	0.98	1.20	54.25	0.40	43.00
Pb-2-3	4.6-6.1	(15-20)	0.80	1.15	53.60	0.78	42.99
Pb-2-4	6.1-7.6	(20-25)	1.15	1.55	53.45	0.58	42.45
Pb-2-5	7.6-9.2	(25-30)	1.45	1.30	54.15	0.40	42.85
Pb-2-6	9.2-10.7	(30-35)	1.46	0.86	53.60	0.64	43.05
Pb-2-7	10.7-12.2	(35-45)	1.76	1.04	53.35	0.80	42.85
Pb-2-8	15.3-16.8	(50-55)	4.10	1.85	51.75	0.43	41.50
Average Assay			1.58	1.25	53.5	0.60	

COLCHESTER COUNTY

PENNY MOUNTAIN AREA (PM-2-1)*

The following is the average of detailed chemical analyses of 78 m of drillcore.

SiO_2	Al_2O_3	TiO_2	P_2O_5	Fe_2O_3	CaO	MgO	Na_2O	K_2O	SO_3	SrO	LOI	Cl
6.79	1.70	0.06	0.04	0.53	49.99	0.66	0.06	0.17	0.17	0.04	39.81	0.009
*analyses from Lefrenière and Clark, 1986												

HALIFAX COUNTY

DOLLAR LAKE AREA (DL-1-1)

Hole Number: **1 (Dollar Lake)**
Location: Lat.: 44°56'39", Long.: 63°17'11"
Ultimate Depth: 24.1 m (79'02")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.1 (0'-6'11")	Overburden	
2.1-20.9 (6'11"-68'06")	Dolomite	Brown, hard, dense, massive, Windsor Group dolomite, belonging to the B_1 Subzone (Bell, 1929). Very few fossils. A few brachiopods were found. Numerous small cavities and some calcite filled brachiopod cavities. Contains some secondary calcite, but only in small amounts. The dolomite becomes grey in colour and more calcareous near the bottom. No bedding is shown.
20.9-22.5 (68'06"-73'10")	Limestone	Grey, hard, very argillaceous, with small fragments of the underlying Meguma Group slate. Numerous thin seams of black carbonaceous material throughout, with small rounded white fragments (fossils(?)).
22.5-24.1 (73'10"-79'02")	Slate	Grey, hard, Meguma Group slate with numerous fractures and shears.
		END OF HOLE

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
DL-1-1	2.1-3.1	(6.09-10)	0.40	2.81	31.40	19.40	46.45
DL-1-2	3.1-4.6	(10-15)	0.55	2.27	31.05	19.50	46.40
DL-1-3	4.6-6.1	(15-20)	0.48	2.60	31.15	19.55	46.25
DL-1-4	6.1-7.6	(20-25)	0.98	2.42	31.65	18.95	45.70
DL-1-5	7.6-9.2	(25-30)	1.20	2.77	30.40	19.70	46.05
DL-1-6	9.2-10.7	(30-35)	0.89	2.74	30.50	19.75	46.10
DL-1-7	10.7-12.2	(35-40)	1.60	2.68	31.20	19.00	45.60
DL-1-8	12.2-13.7	(40-45)	0.74	2.01	31.10	19.75	46.30
DL-1-9	13.7-15.3	(45-50)	1.03	2.46	30.60	19.55	45.95
DL-1-10	15.3-16.8	(50-55)	1.44	2.97	30.75	18.85	45.90
DL-1-11	16.8-18.3	(55-60)	3.54	4.64	30.30	17.65	44.05
DL-1-12	18.3-19.8	(60-65)	1.41	3.00	30.50	19.05	45.40
DL-1-13	19.8-21.4	(65-70)	10.10	7.50	26.90	14.95	39.90
DL-1-14	21.4-22.6	(70-74)	31.20	9.80	19.25	11.58	27.60
Average Assay			3.97	3.62	29.76	17.68	

Hole Number: **2 (Dollar Lake)**
Location: Lat.: 44°56'35", Long.: 63°17'09"
Ultimate Depth: 17.9 m (58'10")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-1.2 (0'-4')	Overburden	
1.2-10.7 (4'-35')	Dolomite	Brown, hard, massive, slightly porous, B_1 Subzone (Bell, 1929), Windsor Group dolomite. Contains numerous small cavities, some partially filled with calcite. No bedding is shown. Any fossils which may have been present appear to have been destroyed.
10.7-13.4 (35'-43'11")	Dolomite	Grey, hard, dense, medium grained, siliceous, Windsor Group dolomite. The dolomite contains numerous black bands of carbonaceous material. Contains some pyrite and chalcopyrite along these seams.
13.4-17.9 (43'11"-58'10")	Slate	Dark grey, Meguma Group slate alternating at various intervals with a breccia. Numerous shears containing graphitic material. Portions of the slate contain some red hematite material.
		END OF HOLE

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
DL-2-1	1.2-3.1	(4-10)	0.60	3.42	31.40	18.70	45.98
DL-2-2	3.1-4.6	(10-15)	0.60	3.08	31.60	18.55	46.05
DL-2-3	4.6-6.1	(15-20)	0.85	3.51	32.10	17.85	45.95
DL-2-4	6.1-7.6	(20-25)	0.86	3.19	31.90	18.35	45.85
DL-2-5	7.6-9.2	(25-30)	0.96	2.04	31.85	18.65	45.75
DL-2-6	9.2-10.7	(30-35)	1.29	4.25	32.00	17.45	45.40
DL-2-7	10.7-12.2	(35-40)	3.95	5.40	29.95	16.65	43.60
DL-2-8	12.2-13.4	(40-44)	4.65	4.80	29.40	17.20	42.99
Average Assay			1.72	3.71	31.29	17.90	

Hole Number: **3 (Dollar Lake)**
Location: Lat.: 44°56'31", Long.: 63°17'06"
Ultimate Depth: 10.7 m (35')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-6.7 (0'-21'11")	Overburden	
6.7-10.7 (21'11"-35')	Slate	(Meguma Group) Dark grey, hard, very micaceous with cleavage dipping 55°. Numerous shears contain dark carbonaceous material with slippage in the horizontal direction. Some red hematite staining.
		END OF HOLE

Hole Number: **4 (Dollar Lake)**
Location: Lat.: 44°56'41", Long.: 63°17'09"
Ultimate Depth: 15.3 m (50')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-11 (0'-36')	Overburden	Sand and gravel.
11-15.3 (36'-50')	Slate	(Meguma Group).
		END OF HOLE

HALIFAX COUNTY

GAYS RIVER AREA (GR-3-2, GR-3-3) (COOKS BROOK)

Hole Number: **1 (Gays River)**
Location: Lat.: 45°02'10", Long.: 63°18'52"
Ultimate Depth: 18.6 m (61')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.4 (0'-8')	Overburden	
2.4-15.5 (8'-50'11")	Dolomite	Grey, hard, dense, fossiliferous, massive, B_1 Windsor Group dolomite. Dolomite is slightly porous. Bryozoans are the only abundant fossil type with some brachiopods and one *Paraconularia planicostata* being found. Two types of bryozoa are found, the stick type and the fenestrate type. Only a few stylolites are in evidence. Very few cavities and secondary calcite.
15.5-15.7 (50'11"-51'08")	Breccia	Small, angular fragment of quartzite in a dolomite matrix. Limestone matrix contains small fossil fragments.
15.7-18.6 (51'08"-61')	Quartzite	Grey, hard, dense, micaceous, Goldenville Formation quartzite.
		END OF HOLE

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
CB-1-1	2.4-3.1	(8-10)	1.58	2.30	30.60	19.45	45.55
CB-1-2	3.1-4.6	(10-15)	1.18	1.81	31.20	19.35	46.05
CB-1-3	4.6-6.1	(15-20)	1.37	1.69	32.05	19.05	46.05
CB-1-4	6.1-9.1	(20-30)	7.65	2.28	29.70	17.05	42.50
CB-1-5	9.1-10.7	(30-35)	3.23	1.87	31.10	18.40	45.05
CB-1-6	10.7-12.2	(35-40)	5.18	2.43	30.40	17.85	44.20
CB-1-7	12.2-13.7	(40-45)	5.25	2.27	30.45	18.05	44.05
CB-1-8	13.7-15.2	(45-50)	8.55	3.02	28.75	17.20	40.50
CB-1-9	15.2-15.9	(50-52)	35.25	7.55	18.90	9.85	27.20
Average Assay	2.4-15.2	(8-50)	4.26	2.21	30.53	18.30	44.25

Special Notes: 7.8-15.5 m (25'08"-50'11") Bryozoans are very abundant.
14.5 m (47'07") 1 *Paraconularia planicostata*.

Hole Number: **2 (Gays River)**
Location: Long.: 45°02'19", Long.: 63°18'15"
Ultimate Depth: 21.4 m (70')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.4 (0'-8')	Overburden	
2.4-18.5 (8'-60'08")	Dolomite	Dark brown, hard, dense, massive, fossiliferous, Windsor Group dolomite. Bryozoan are abundant along with some brachiopods, pelecypods and gastropods. Both fenestrate and stick bryozoa are present with stick bryozoa being very abundant from 10.5 m (34'04") to the end of the dolomite. Fossils are very abundant, small and not well preserved. Few stylolites are present and are more or less parallel to the horizontal. These seams contain black carbonaceous material. Very few large cavities, but numerous small cavities (some filled with calcite) making the dolomite slightly porous. Few blebs of pyrite and chalcopyrite noticed. Few small fragments of quartzite found at various levels. Dolomite becomes very soft and porous at the quartzite contact.
18.5-20.7 (60'08"-67'11")	Quartzite	Dark grey, hard, fine grained, Goldenville Formation quartzite.

20.7-21.4 (67'11"-70')	Breccia	Quartzite fragments in a limestone matrix. Some bands of quartzite. Hole ended in this breccia.
		END OF HOLE

Special Notes:	2.6 m (8'05")	Fenestrate bryozoa.
	5.28-5.33 m (17'04"-17'06")	Quartzite fragment.
	5.41-5.51 m (17'09"-18'01")	Quartzite fragment.
	8.9 m (29'03")	Pyrite.
	10.5 m (34'04")	Stick bryozoa become very abundant from here to the end of the limestone. Bryozoa are filled with white chalk like calcite with a hollow section in the middle.
	11.25 m (36'11")	Chalcopyrite lining some of the very small cavities.
	16 m (52'08")	Fragments of quartzite.
	17.9 m (58'11")	Small quartzite fragments found in the limestone.

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
CB-2-1	2.4-4.6	(8-15)	1.04	1.95	31.95	18.90	46.45
CB-2-2	4.6-6.1	(15-20)	2.94	2.32	30.50	17.95	45.60
CB-2-3	6.1-7.6	(20-25)	0.82	1.87	31.60	19.35	46.55
CB-2-4	7.6-9.2	(25-30)	2.30	1.34	31.10	19.55	46.05
CB-2-5	9.2-10.7	(30-35)	2.48	1.56	30.50	19.60	45.85
CB-2-6	10.7-12.2	(35-40)	1.65	1.98	30.75	19.15	46.05
CB-2-7	12.2-13.7	(40-45)	3.89	2.33	30.05	17.95	44.95
CB-2-8	13.7-15.3	(45-50)	7.03	2.75	30.40	16.75	43.05
CB-2-9	15.3-16.8	(50-55)	10.70	3.24	29.50	15.15	40.95
CB-2-10	16.8-18.5	(55-60.08)	14.40	4.21	27.30	13.95	38.55
Average Assay 2.4-13.7 m (8-45)			2.16	1.90	30.91	18.91	45.95

Hole Number: **3 (Gays River)**
Location: Lat.: 45°02'19", Long.: 63°18'46"
Ultimate Depth: 15.7 m (51'08")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.6 (0'-8'08")	Overburden	
2.6-13.6 (8'08"-44'09")	Dolomite	Brown, hard, slightly porous, massive, fossiliferous, B_1 Windsor Group dolomite. Fossils are abundant, but not well preserved. Fossils include gastropods, pelecypods, bryozoa and brachiopods. Contains a few stylolites containing black carbonaceous material along the seam. At 10.7 m (35') bryozoa becomes very abundant. Dolomite makes an angle of 50° with the underlying quartzite at the contact.
13.6-15.7 (44'09"-51'08")	Quartzite	Dark grey, very hard, fine grained, Goldenville Formation quartzite.
		END OF HOLE

Lost Core: 3.3-4.0 m (10'09"-13'01")
6.7-7.3 m (21'11"-24')

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
CB-3-1	2.6-4.6	(8.08-15)	0.81	1.80	31.35	19.55	46.20
CB-3-2	4.6-6.1	(15-20)	1.19	1.75	32.45	18.35	46.65
CB-3-3	6.1-7.6	(20-25)	1.13	1.75	31.20	19.70	46.40
CB-3-4	7.6-9.2	(25-30)	2.41	1.42	31.30	18.81	45.75
CB-3-5	9.2-10.7	(30-35)	1.45	1.83	32.05	18.40	46.25
CB-3-6	10.7-12.2	(35-40)	2.62	1.99	30.90	18.85	45.45
CB-3-7	12.2-13.7	(40-44.10)	5.49	2.38	30.20	17.55	44.05
Average Assay			2.16	1.84	31.30	18.85	45.90

Hole Number: **4 (Gays River)**
Location: Lat.: 45°02'18", Long.: 63°18'43"
Ultimate Depth: 12.2 m (40')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.6 (0'-8'07")	Overburden	(A cavity was penetrated at 0.6 m (2')).
2.6-10.4 (8'07"-34')	Dolomite	Light brown, hard, dense, massive, fossiliferous, B_1 Windsor Group dolomite. Bryozoa are very abundant throughout (mainly the fenestrate type with some stick type bryozoa). Other fossils found include brachiopods, gastropods, pelecypods and two *Paraconularia planicostata*. Some very small tension fractures containing clear calcite are found throughout. Very few stylolites are present. Dolomite changes to a slightly siliceous limestone in the latter 0.9 m (3') of the carbonate section.
10.4-12.2 (34'-40')	Quartzite	Hard, dense, dark grey, fine grained, Goldenville Formation quartzite. END OF HOLE

Special Notes:	7.7 m; 7.9 m (25'05"; 25'11")	*Paraconularia planicostata*.
	8.5 m (27'10")	Quartzite fragment.
	9.5-10.4 m (31'-34')	Dolomite becomes more calcareous. It is hard, grey, slightly siliceous with very few fossils.

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
CB-4-1	2.6-4.6	(8.06-15)	2.22	1.59	31.40	19.25	45.85
CB-4-2	4.6-6.1	(15-20)	3.22	2.10	30.80	18.75	45.15
CB-4-3	6.1-7.6	(20-25)	1.71	1.67	32.05	18.75	46.10
CB-4-4	7.6-9.2	(25-30)	3.77	1.89	30.95	18.25	44.95
CB-4-5	9.2-10.4	(30-34)	6.16	2.39	30.05	17.95	43.55
Average Assay 2.6-9.2 m (8.06-30)			2.73	1.81	31.30	18.80	45.50

Hole Number: **5 (Gays River)**
Location: Lat.: 45°02'21", Long.: 63°18'39"
Ultimate Depth: 7.5 m (24'06")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-3.1 (0'-10')	Overburden	(Broken dolomite from 1.2-3.0 m (4'-10') with no core).
3.1-5.9 (10'-19'03")	Dolomite	Greyish-brown, hard, dense, massive, B_1 Windsor Group dolomite. Contains very few fossils with only a few bryozoa being found. Very few cavities, some containing clear calcite. Stylolites are abundant with dark carbonaceous material along these seams.
5.9-7.5 (19'03"-24'06")	Quartzite	Dark grey, very hard, fine grained, micaceous, Goldenville Formation quartzite. One part of this quartzite is brecciated.
		END OF HOLE
Special Notes: 6.81-6.86 m (22'04"-22'06")		Breccia - quartzite fragments in a dolomite matrix.

Sample Number	Width m	Width (ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
CB-5-1	3.1-4.6	(10-15)	3.09	2.11	30.35	19.20	45.45
CB-5-2	4.6-5.9	(15-19.03)	1.86	1.59	31.05	19.35	46.05
Average Assay			2.48	1.85	30.70	19.28	45.75

Hole Number: **6 (Gays River)**
Location: Lat.: 45°02'22", Long.: 63°18'41"
Ultimate Depth: 22.9 m (75')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-1.3 (0'-4'04")	Overburden	
1.3-20.7 (4'04"-68')	Dolomite	It is a light brown, hard, slightly porous, granular, massive, fossiliferous, Windsor Group dolomite. The fossils found include gastropods, bryozoans, brachiopods, pelecypods, conularia and some unidentified, small, horn shaped fossils. Also contains some small, rounded, oncolitic type structures from 3.2-3.5 m (10'06"-11'04") giving the dolomite a mottled appearance. No apparent orientation of the fossils except that the gastropods have their apex slanting down the hole or flat lying. Cavities are not very abundant (mainly fossil cavities). Secondary calcite fills most of these cavities. Numerous black ca[illegible]onaceous seams are present. Some of the dark seams are stylolites. These stylolites are more or less flat lying and are the only indicators of any stratification. At 5.8 m (19') some of the cavities contain some purple crystals (fluorite(?) or calcite(?)). At 13.1 m (42'11") stick bryozoans become very abundant, similar to the other holes at Cooks Brook. Fenestrate bryozoans are also present here. Small quartzite fragments are found in the dolomite near the end of the dolomite section.
20.7-21.4 (68'-70'04")	Quartzite	Dark grey, hard, fine grained, Goldenville Formation quartzite.
21.4-21.7 (70'04"-71'03")	Breccia	Dark grey, quartzite fragments in a grey, hard, dense, limestone matrix.
21.7-21.8 (71'03"-71'08")	Quartzite	Dark grey, hard, fine grained, Goldenville Formation quartzite.
21.8-22.1 (71'08"-72'07")	Breccia	Dark grey, quartzite fragments in a limestone.
22.1-22.3 (72'07"-73'03")	Limestone	Dark grey, hard, dense, Windsor Group limestone.

22.3-22.7 (73'03"-74'06")	Breccia	Dark grey, quartzite fragments in a grey, hard limestone matrix.
22.7-22.9 (74'06"-75')	Quartzite	Dark grey, hard, fine grained, Goldenville Formation quartzite.
		END OF HOLE

Special Notes:	3.2-3.6 m (10'06"-11'04")	Small, rounded, oncolitic type structures giving the dolomite a mottled appearance.
	3.7-3.8 m (12'02"-12'06")	Black carbonaceous seams along with thin calcite veins.
	5.8 m (19')	Purple fluorite(?) or calcite in cavity.
	13.1-20.7 m (42'11"-68')	Stick bryozoans become very abundant.
	15.9 m (52'02")	*Paraconularia planicostata.*
	15.4-17.3 m (50'05"-56'09")	Very porous, very fossiliferous section composed almost entirely of fossil shells and fragments.
	19.8-20.7 m (65'-68')	Small quartzite fragments found in the dolomite.
Lost Core:	1.5-2.8 m (5'-9'01")	
	12.2-12.6 m (40'-41'05")	

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
CB-6-1	1.3-4.6	(4.04-15)	1.01	1.50	31.45	19.40	46.55
CB-6-2	4.6-6.1	(15-20)	1.44	2.24	32.30	18.60	45.99
CB-6-3	6.1-7.6	(20-25)	1.42	2.16	31.40	18.95	45.85
CB-6-4	7.6-9.2	(25-30)	1.25	1.70	30.90	19.55	46.50
CB-6-5	9.2-10.7	(30-35)	1.36	1.82	31.80	19.05	46.35
CB-6-6	10.7-12.2	(35-40)	2.65	1.57	30.55	19.35	45.95
CB-6-7	12.2-13.7	(40-45)	2.28	1.36	31.10	19.05	46.15
CB-6-8	13.7-15.3	(45-50)	1.43	1.87	31.05	18.45	46.50
CB-6-9	15.3-16.8	(50-55)	1.84	2.74	31.05	18.45	45.85
CB-6-10	16.8-18.3	(55-60)	5.32	3.39	29.30	17.95	43.55
CB-6-11	18.3-19.8	(60-65)	9.95	3.80	28.80	15.70	41.15
CB-6-12	19.8-20.7	(65-68)	10.90	3.95	27.50	16.20	40.50
Average Assay	1.3-18.3	(4'04"-60')	2.00	2.04	31.09	18.88	45.92

Hole Number: **7 (Gays River)**
Location: Lat.: 45°02'24", Long.: 63°18'24"
Ultimate Depth: 19.9 m (65'05")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.2 (0'-7'04")	Overburden	
2.2-8.5 (7'04"-28')	Dolomite	Light brown, hard, slightly porous, fossiliferous, massive, Windsor Group dolomite. The fossils found include brachiopods, bryozoans, gastropods, paraconularia and pelecypods. Fossils are not very abundant as compared with other holes in this area. All cavities are filled or partially filled with calcite. The fossil cavities generally contain drusy, calcite crystals. Contains some black, carbonaceous seams. No stylolites were noted.
8.5-9.2 (28'-30')	Limestone	Light grey, hard, dense, slightly crystalline, fossiliferous, dolomitic Windsor Group limestone. Gastropods are very abundant with a few pelecypods.
9.2-16.9 (30'-55'06")	Dolomite	Light brown, hard, slightly porous, massive, fossiliferous, Windsor Group dolomite. Fossils include brachiopods, paraconularia, gastropods, bryozoans and pelecypods. No apparent orientation. Cavities are not abundant, but most cavities are completely filled with calcite. Some of the fossil cavities are partially filled with calcite crystals. No stylolites present. A few black carbonaceous seams are present and are trending in a vertical direction. Small quartzite fragments are found in the dolomite from 15.5-16.9 (50'11"-55'06").
16.9-17.2 (55'06"-56'05")	Quartzite	Dark grey, hard, dense, fine grained, Goldenville Formation quartzite.
17.2-17.3 (56'05"-56'11")	Breccia	Small, dark grey quartzite fragments in a light brown, dolomite matrix.

17.3-18.0 (56'11"-59'01")	Quartzite	Dark grey, hard, dense, fine grained, Goldenville Formation quartzite containing some thin calcite veins.
18.0-18.3 (59'01"-60')	Breccia	Small, dark grey, quartzite fragments in a light brown dolomite matrix.
18.3-18.8 (60'-61'10")	Quartzite	Dark grey, hard, dense, fine grained, Goldenville quartzite containing some thin calcite veins.
18.8-19.2 (61'10"-63')	Breccia	Small, dark grey, quartzite fragments in a light brown dolomite matrix.
19.2-19.7 (63'-64'09")	Quartzite	Dark grey, hard, dense, fine grained, Goldenville Formation quartzite.
19.7-19.9 (64'09"-65'03")	Breccia	Quartzite fragments in a light brown dolomite matrix.
19.9-19.94 (65'03"-65'05")	Quartzite	Dark grey, hard, dense, fine grained, Goldenville Formation quartzite.
		END OF HOLE

Special Notes:	4.9 m (16'01")	*Paraconularia planicostata.*
	7.7 m (25'02")	*Paraconularia planicostata.*
	9.7 m (31'11")	*Paraconularia planicostata.*
	14.9 m (49')	*Paraconularia planicostata.*
	15.5-16.9 m (50'11"-55'06")	Small, dark grey, very hard, quartzite fragments are found in the dolomite.
Lost Core:	3.1-3.7 m (10'-12'01")	
	4.0-4.3 m (13'-14'01")	
	6.5-7.5 m (21'05"-24'08")	
	12.3-13.4 m (40'05"-43'10")	
	16.3-16.7 m (53'04"-54'08")	

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
CB-7-1	2.2-4.6	(7.04-15)	2.51	2.32	31.30	18.65	45.00
CB-7-2	4.6-6.1	(15-20)	0.82	1.85	32.45	18.60	45.60
CB-7-3	6.1-7.6	(20-25)	1.35	1.80	32.45	18.65	45.70
CB-7-4	7.6-9.2	(25-30)	1.45	1.98	36.70	14.35	45.15
CB-7-5	9.2-10.7	(30-35)	1.53	1.70	31.80	18.59	46.20
CB-7-6	10.7-12.2	(35-40)	1.80	1.85	33.45	17.20	45.40
CB-7-7	12.2-15.3	(40-50)	5.45	3.12	34.45	13.35	42.75
CB-7-8	15.3-16.9	(50-55.06)	8.65	3.11	29.90	15.85	41.70
Average Assay	2.2-15.3	(7'04"-50')	2.13	2.07	33.20	17.05	45.20

HALIFAX COUNTY

MEAGHERS GRANT AREA (MG-5-1)

Hole Number: **1 (Meaghers Grant)**
Location: See Figures 46 and 74 for approximate location
Ultimate Depth: 6.1 m (20')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-1.5 (0'-5')	Overburden	
1.5-3.0 (5'-9'09")	Dolomite	Brownish-grey, hard, dense, medium grained, Windsor Group dolomite. Contains numerous irregular fractures parallel to bedding plane and contains black carbonaceous material. No fossils noted. Contains numerous very small cavities. Very little secondary calcite associated with the dolomite.
3.0-6.1 (9'09"-20')	Quartzite	Greenish-grey, very hard, Goldenville Formation quartzite.
		END OF HOLE

HALIFAX COUNTY

MIDDLE MUSQUODOBOIT AREA (Mo-2-1)

Hole Number: **1 (Middle Musquodoboit Mo-2-1)**
Location: Lat.: 45°00'21", Long.: 63°10'29"
Ultimate Depth: 15 m (49'03")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-1.5 (0'-5')	Overburden	
1.5-4.8 (5'-15'10")	Limestone	Brown, hard, slightly porous, medium grained, dolomitic, Windsor Group limestone. Belongs to the Upper Windsor (Bell, 1929). No fossils were noted in the core; but, in the quarry, bryozoans, corals, crinoid stems and brachiopods (Giganto productus) were found. Very few cavities and no secondary calcite.
4.8-13.2 (15'10"-43'03")	Limestone	Grey, hard, dense, medium grained, Windsor Group limestone. Limestone is siliceous with small bands of clayey and arenaceous material throughout. Towards the bottom of the limestone it becomes very compact and fine grained. Few calcite stringers. Beds are flat lying.
13.2-14.7 (43'03"-48'04")	Conglomerate	Pebbles of rounded quartz and greywacke in a calcareous ground mass.
14.7-15 (48'04"-49'03")	Greywacke	Grey, medium grained, hard.
		END OF HOLE

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Mo-1-1	1.5-3.1	(5-10)	11.70	4.39	27.75	15.50	40.50
Mo-1-2	3.1-4.6	(10-15)	16.85	8.72	25.80	11.25	37.70
Mo-1-3	4.6-6.1	(15-20)	13.30	5.99	28.80	12.50	38.80
Mo-1-4	6.1-7.6	(20-25)	28.90	6.35	24.60	9.00	30.10
Mo-1-5	7.6-9.2	(25-30)	20.50	5.70	30.80	7.95	33.60
Mo-1-6	9.2-11.0	(30-36)	36.20	8.68	27.75	1.25	24.20
Average Assay			21.24	6.63	27.58	9.57	34.15

HALIFAX COUNTY

MIDDLE MUSQUODOBOIT AREA (MURCHYVILLE) (Mo-10-1)

Hole Number: **1 (Murchyville)**
Location: Lat.: 44°59'34", Long.: 63°08'19"
Ultimate Depth: 13.2 m (43'04")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-0.6 (0'-1'10")	Overburden	
0.6-3.8 (1'10"-12'06")	Dolomite	Brown, hard, dense, massive, slightly fossiliferous, Windsor Group dolomite. A few stylolites are present and appear to be horizontal. The brown colouring is a rusty iron coating which is found throughout this section. Contains numerous cavities, some containing drusy calcite, but most contain no calcite. Only a few of these cavities are fossil cavities. Contains some gastropods with one brachiopod being found. The fossils are poorly preserved.
3.8-12.9 (12'06"-42'06")	Dolomite	Dark grey, hard, dense, siliceous, massive, slightly fossiliferous, Windsor Group dolomite. Secondary calcite is very abundant, filling cavities and veins. Stylolites are abundant throughout. Contains numerous fractures with black, soft, graphite like carbonaceous material along the seams. Contains a few brachiopods. Contains pyrite and chalcopyrite along fractures throughout. Contains a few shaly layers.

12.9-13.2 (42'06"-43'04")	Slate	Dark grey, hard, Meguma Group slate. Slate is dipping almost vertically.
		END OF HOLE

Special Notes:	3.2 m (10'05")	Four gastropods are found (small and not well preserved).
	4.3 m (14'03")	Fracture zone.
	4.5 m; 5.4 m; 6.2 m; 12.9 m (14'08"; 17'10"; 20'03"; 42'04")	Chalcopyrite.
	7.4 m (24'02")	Vertical fractures with pyrite along the seam with some chalcopyrite.
	7.6-7.7 m; 8.1-8.3 m; 9.1-9.2 m (25'-25'02"; 26'11"-27'02"; 29'09"-30')	Pyrite and chalcopyrite.
	11.7-11.9 m (38'04"-39')	Dark grey, shaly limestone.

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Mv-1-1	0.6-1.5	(1.8-5)	1.35	4.45	30.40	18.50	45.20
Mv-1-2	1.5-3.1	(5-10)	1.35	4.80	31.90	17.05	44.95
Mv-1-3	3.1-4.6	(10-15)	1.39	5.40	32.20	16.30	45.20
Mv-1-4	4.6-6.1	(15-20)	2.48	5.50	30.10	17.35	44.01
Mv-1-5	6.1-7.6	(20-25)	2.20	5.40	29.70	18.00	43.50
Mv-1-6	7.6-9.2	(25-30)	2.30	5.52	29.05	17.32	43.25
Mv-1-7	9.2-10.7	(30-35)	3.85	6.11	28.05	17.40	42.55
Mv-1-8	10.7-12.2	(35-40)	4.01	7.22	28.80	16.85	42.95
Mv-1-9	12.2-13	(40-42.4)	6.20	8.80	27.95	15.80	41.15
Average Assay	0.6-12.2	(1.8-40)	2.36	5.55	30.02	17.40	44.00

Hole Number: **2 (Murchyville)**
Location: Lat.: 44°59'34", Long.: 63°00'15"
Ultimate Depth: 17.8 m (58'06")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.2 (0'-7'03")	Overburden	
2.2-6.3 (7'03"-20'08")	Dolomite	Grey, hard, dense, massive, slightly siliceous, Windsor Group dolomite. No fossils were found. Contains numerous cavities containing various amounts of calcite crystals. Shows no bedding. Very few stylolites. Few very small fracture zones.
6.3-7.1 (20'08"-23'02")	Dolomite	Dark grey, hard, dense, banded, argillaceous, siliceous, Windsor Group dolomite. Banding is almost horizontal. Limestone is shaly and siliceous.
7.1-16.8 (23'02"-55')	Dolomite	Dark grey, hard, dense, massive, slightly fossiliferous, Windsor Group dolomite. Contains numerous cavities (some fossil cavities) which are filled or partially filled with white or clear calcite crystals. Contains numerous small fractures containing black carbonaceous material along the seams. Fossils are very poorly preserved and scarce and only brachiopods are present. Near the end of this section some cavities have the appearance of being gastropod cavities. Pyrite and/or chalcopyrite can be seen throughout this section along fracture seams and is much more abundant than is normally found in limestones. Near the end of the dolomite section there appears to be rounded, algal structures, but these are not well defined. Very few stylolites are present.
16.8-17.8 (55'-58'06")	Breccia	Dolomite breccia containing numerous large and small sharp fragments of the underlying Meguma slate. These fragments are set in a dolomite matrix.
		END OF HOLE

Special Notes:	7.6 m (25'01")	Chalcopyrite and pyrite.
	7.9 m (25'10")	Pyrite and chalcopyrite.
	8.3 m (27'03")	Fossil cavities, filled or partially filled with calcite.
	10.3 m (34'01")	1.3 cm (1/2") band of pyrite.
	10.4 m (34'03")	Large brachiopod.

10.5 m (34'04")	Stylolite (60° to horizontal may indicate steeply dipping bedding).
10.6 m (34'10")	Pyrite and chalcopyrite.
10.7-11.3 m (35'-37')	Pyrite abundant along seams and fractures, also small amounts of chalcopyrite.
12.4-12.5 m (40'10"-41'02")	Fracture zone.
12.7 m (41'09")	Band of pyrite.
15.2 m (49'10")	Chalcopyrite.

Lost Core: 3.4-3.7 m (11'00"-12'01")
16.5-16.8 m (54'03"-55')

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Mv-2-1	2.2-3.1	(7.3-10)	1.55	6.05	29.30	17.45	44.60
Mv-2-2	3.1-4.6	(10-15)	2.55	6.30	29.55	16.95	44.05
Mv-2-3	4.6-6.1	(15-20)	1.75	5.80	29.50	17.80	44.10
Mv-2-4	6.1-7.6	(20-25)	6.22	8.40	26.30	16.15	41.20
Mv-2-5	7.6-9.2	(25-30)	4.15	7.10	28.25	17.05	42.50
Mv-2-6	9.2-10.7	(30-35)	2.05	6.45	29.80	16.95	43.35
Mv-2-7	10.7-12.2	(35-40)	2.55	7.20	28.40	17.10	42.80
Mv-2-8	12.2-13.7	(40-45)	5.95	10.20	26.25	15.70	39.60
Mv-2-9	13.7-15.3	(45-50)	4.55	5.85	28.25	17.25	42.65
Mv-2-10	15.3-16.8	(50-55)	3.75	5.95	28.70	17.45	43.30
Average Assay			3.50	6.93	28.43	16.98	42.82

Hole Number: **3 (Murchyville)**
Location: See Figures 45 and 78 for approximate location
Ultimate Depth: 12.6 m (41'06")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-11.5 (0'-37'09")	Overburden	
11.5-12.6 (37'09"-41'06")	Slate	Grey, hard, arenaceous, banded, Meguma Group slate.
		END OF HOLE

HALIFAX COUNTY

MIDDLE MUSQUODOBOIT AREA (BROOKVALE) (Mo-11-1) (Mo-21-1) (Mo-12-1)

Hole Number: **1 (Brookvale)**
Location: Lat.: 45°01'06", Long.: 63°05'55"
Ultimate Depth: 18 m (59')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.7 (0'-9')	Overburden	
2.7-3.4 (9'-14'04")	Dolomite	Brown, hard, dense, slightly fossiliferous, massive, Windsor Group dolomite or dolomitic limestone. Contains small amounts of small calcite crystals. Contains a few small cavities, some being brachiopod cavities. Few stylolites parallel to the bedding.
3.4-6.4 (14'04"-21'01")	Dolomite	Dark grey, hard, dense, massive, Windsor Group dolomite. Contains a few stylolites with black carbonaceous material along the seams. These stylolites are parallel to the bedding and are horizontal. Contains numerous very small cavities, none of which are fossil cavities. Some of these cavities are filled or partially filled with calcite. Some very thin calcite veins.
6.4-8.6 (21'01"-28'01")	Dolomite	Dark grey, hard, dense, medium grained, argillaceous, siliceous, Windsor Group dolomite. Very impure with thin layers of shale being found at 7.1 m; 7.3-7.4 m (23'04"; 24'01"-24'03"). No cavities, but contains a few very thin calcite stringers with no apparent orientation. Has well developed bedding.
8.6-16.2 (28'01"-53')	Dolomite	Grey, hard, dense, massive, fossiliferous, Windsor Group dolomite. Contains numerous large and small cavities, many being fossil cavities. Gastropods are large and numerous and appear to be oriented with their long direction parallel to the horizontal bedding. Brachiopod cavities are also found. Very little calcite is found in the cavities.

16.2-18 (53'-59')	Slate	Dark grey, hard, Meguma Group slate. Contains some thin red bands of hematite. Shows slaty cleavage.
		END OF HOLE

Special Notes:	9.6-9.8 m (31'07"-32')	Black, graphitic material along fractures.
	15.4 m (50'08")	1.3 cm (½") calcite vein.
	15.9 and 16.2 m (52'04" and 53')	Pyrite and chalcopyrite.
	16.2 m (53')	Pieces of slate in limestone.

Lost Core:
10.4-10.8 m (34'01"-35'06")
11.1-11.6 m (36'05"-38'01")
16.1-16.9 m (53'01"-55'04")
17.1-17.4 m (56'02"-57'01")

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Bv-1-1	3.1-4.6	(10-15)	1.28	3.44	30.50	18.30	45.50
Bv-1-2	4.6-6.1	(15-20)	0.90	3.71	30.20	19.20	45.60
Bv-1-3	6.1-7.6	(20-25)	5.50	6.80	28.05	16.50	42.05
Bv-1-4	7.6-9.2	(25-30)	4.07	5.40	28.40	18.05	43.60
Bv-1-5	9.2-10.7	(30-35)	3.65	4.65	28.70	18.05	44.20
Bv-1-6	10.7-12.2	(35-40)	2.64	3.44	29.80	19.10	45.60
Bv-1-7	12.2-13.7	(40-45)	0.80	3.10	30.50	19.50	45.95
Bv-1-8	13.7-15.3	(45-50)	1.35	3.80	30.20	19.10	45.50
Bv-1-9	15.3-16.8	(50-55)	2.30	4.35	30.40	17.20	44.50
Average Assay			2.49	4.29	29.63	18.33	44.72

Hole Number: **2 (Brookvale)**
Location: Lat.: 45°01'10", Long.: 63°05'46"
Ultimate Depth: 24.4 m (80')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.4 (0'-8')	Overburden	
2.4-20.1 (8'-65'11")	Dolomite	Brown, hard, porous, massive, slightly fossiliferous, Windsor Group dolomite. Stylolites are found throughout, but are not overly abundant. These stylolites are dipping at an angle of 20° to the horizontal. Dip of the bedding is probably also 20°, but no evidence other than the stylolites is available. Small cavities are quite numerous throughout (very few are fossil cavities). Calcite fills some of the cavities. A few calcite stringers are present and are almost vertical (80°). Fossils found include gastropods, bryozoans, pelecypods and brachiopods, with gastropods being the most abundant. Dolomite becomes dolomitic limestone at 8.8 m (29') with fewer cavities, and being less porous and more compact.
20.1-22.8 (65'11"-74'08")	Limestone	Grey, hard, dense, dolomitic massive, Windsor Group limestone. Fossils become more abundant with most cavities being fossil cavities.
22.8-24.4 (74'08"-80')	Shale	Dark grey and black brecciated shale. Most of the banding is almost horizontal.
		END OF HOLE

Special Notes:	2.7 m (8'10")	Black carbonaceous material along seams.
	5.8 and 20.9 m (19' and 68'07")	Pyrite filling some of the cavities.
	8.9 m (29'04")	Fossils are noticed from here to the bottom of the limestone (mainly gastropods).
	14.8 m; 15.9 m; 21.8 m (48'07"; 52'; 71'05")	Bryozoans are found (stick bryozoans).
	12.7 m (41'07")	Large, well preserved gastropod is found (*Murchisonia* (Stegocoelia) *abrupta*). This is common to the B Subzone.
	18.4 m (60'04")	Well preserved pelecypod is found (*Aviculopecten lyelli*) which is very abundant in the B Subzone and is not found in the other subzones.
Lost Core:	6.4-6.8 m (21'01"-22'04")	
	7.3-8.1 m (24'-26'05")	
	9.2-9.9 m (30'-32'06")	
	10.4-10.8 m (34'01"-35'07")	

Lost Core: (cont'd)
12.2-12.3 m (40'-40'03")
12.8-13.7 m (41'11"-45')
17.4-17.7 m (57'03"-58'01")
18.5-19.2 m (60'10"-62'10")
21.8-22 m (71'08"-72'03")

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Bv-2-1	2.3-3.1	(7'8"-10)	0.65	3.80	31.70	18.40	45.95
Bv-2-2	3.1-4.6	(10-15)	1.50	3.01	30.60	19.40	45.10
Bv-2-3	4.6-6.1	(15-20)	1.10	3.05	30.40	19.70	45.95
Bv-2-4	6.1-7.6	(20-25)	1.02	2.90	30.30	19.85	45.95
Bv-2-5	7.6-9.2	(25-30)	0.72	2.60	31.60	19.35	46.25
Bv-2-6	9.2-12.2	(30-40)	1.40	2.70	31.20	19.15	46.10
Bv-2-7	12.2-15.3	(40-50)	1.30	2.70	31.20	19.10	46.25
Bv-2-8	15.3-16.8	(50-55)	0.87	2.90	31.05	19.40	46.20
Bv-2-9	16.8-18.3	(55-60)	0.78	2.80	30.90	19.70	46.30
Bv-2-10	18.3-19.8	(60-65)	0.77	2.87	30.60	19.75	46.30
Bv-2-11	19.8-21.4	(65-70)	1.50	3.60	31.30	18.40	45.60
Bv-2-12	21.4-22.8	(70-74'8")	1.20	3.20	30.70	19.10	45.70
Average Assay	2.34-20.42	(7'8"-67)	1.05	3.01	31.00	19.29	46.00

Hole Number: **3 (Brookvale)**
Location: See Figures 56 and 80 for approximate location
Ultimate Depth: 12.8 m (42')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-6.1 (0'-20')	Overburden	
6.1-6.9 (20'-22'06")	Siltstone	Grey, very hard, calcareous and fine grained.
6.9-7.0 (22'06"-23')	Limestone	Greyish-brown, hard, dense, siliceous, dolomitic, Windsor Group limestone.
7.0-7.3 (23'-23'10")	Greywacke	Grey, hard, compact, fine grained and slightly calcareous.
7.3-7.8 (23'10"-25'06")	Limestone	Greyish-brown, hard, dense, siliceous, dolomitic, Windsor Group limestone.

7.8-12.8 (25'06"-42')	Greywacke	Grey, hard, dense, fine grained, highly siliceous and slightly calcareous. Contains a few thin limestone bands and a few carbonaceous seams.
		END OF HOLE

Hole Number: **4 (Brookvale)**
Location: Lat.: 45°01'02", Long.: 63°05'50"
Ultimate Depth: 14.1 m (46'05")
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-3.1 (0'-10')	Overburden.	
3.1-12.5 (10'-41'01")	Limestone	Brownish-grey, hard, dense, massive, dolomitic, Windsor Group limestone. Slightly fossiliferous containing a few *Paraconularia planicostata*, brachiopods and gastropods. The brachiopods are not well preserved. Numerous irregular fractures are found containing black, soft carbonaceous material along the seams. Some stylolites present, but not too abundant (appear to be more or less horizontal). Cavities are quite numerous throughout (no fossil cavities) containing drusy calcite. Cavities become much more numerous near the end of the limestone section.
12.5-14.1 (41'01"-46'05")	Greywacke	Grey, banded, fine grained and hard. Slightly calcareous with some very thin calcite veins.
		END OF HOLE

Special Notes:	3.1 m (10'03")	Black mineral associated with pyrite and calcite.
	4.9 m (16'03")	Small *Paraconularia planicostata* (indicative of the B Subzone).
	5.9-6.1 m (19'06"-20')	Numerous vertical calcite veins with some yellow limonite and reddish hematite staining.
Lost Core:	3.8-4.2 m (12'05"-13'09")	(Cavity).
	5.4-5.5 m (17'09"-18'02")	
	7.2-7.8 m (23'06"-25'06")	

Sample Number	Width m	(ft)	SiO_2 %	R_2O_3 %	CaO %	MgO %	L.O.I. %
Bv-4-1	3.1-4.6	(10-15)	1.15	4.05	32.10	17.60	45.40
Bv-4-2	4.6-6.1	(15-20)	0.45	3.30	32.35	17.95	46.05
Bv-4-3	6.1-7.6	(20-25)	0.50	3.60	32.40	18.10	45.60
Bv-4-4	7.6-9.2	(25-30)	0.48	3.40	33.10	16.70	45.95
Bv-4-5	9.2-10.7	(30-35)	0.46	3.50	30.70	19.15	45.99
Bv-4-6	10.7-13.5	(35-44.02)	0.95	4.00	30.90	18.50	45.20
Average Assay			0.66	3.64	31.92	18.00	45.70

Hole Number: **5 (Brookvale)**
Location: See Figures 56 and 80 for approximate location
Ultimate Depth: 6.4 m (21')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-2.7 (0'-9')	Overburden	
2.7-4.0 (9'-13'03")	Limestone	Brownish-grey, hard, dense, medium grained, oolitic, dolomitic Windsor Group limestone. Slightly porous with no cavities. A few calcite veins along fractures. Limestone is very siliceous.
4.0-6.4 m (13'03"-21')	Quartzite	Grey, very hard, fine grained, containing some mica flakes. Few darker bands of quartzite with some irregular fractures. Very calcareous near the limestone contact (not a sharp contact).
		END OF HOLE

Hole Number: **6 (Brookvale)**
Location: See Figures 56 and 80 for approximate location
Ultimate Depth: 10.7 m (35')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-9.2 (0'-30')	Overburden	
9.2-10.7 (30'-35')	Quartzite	Grey, hard and medium grained. Contains some thin bands of fine grained, dark grey shale.
		END OF HOLE

Hole Number: **7 (Brookvale)**
Location: See Figures 56 and 80 for approximate location
Ultimate Depth: 9.1 m (30')
Proposed Depth: Arbitrary
Dip: -90°

Depth m (ft)	Formation	Description
0-6.4 (0'-21')	Overburden	
6.4-9.1 (21'-30')	Greywacke	Grey, hard, fine grained, calcareous with thin, dark grey, shaly bands throughout.
		END OF HOLE

APPENDIX 2. SAMPLING CODE AND LOCATION OF SURFACE SAMPLES

COLCHESTER COUNTY

Alton (Shubenacadie, 11E/03) (Fig. 2)

At-1-1	45° 12' 08"	
	63° 16' 00"	

Beaver Brook (Truro, 11E/06) (Fig. 5)

BB-1-1	45° 18' 33"	
	63° 24' 34"	
BB-2-1	45° 18' 12"	
	63° 24' 06"	
BB-3-1	45° 19' 10"	
	63° 25' 11"	

Black Rock (Truro, 11E/06) (Fig. 5)

BR-1-1	45° 18' 58"	
	63° 28' 23"	

Brookfield (Shubenacadie, 11E/03 and Truro 11E/06) (Figs. 2, 9)

Br-1-1	45° 16' 17"	
	63° 14' 37"	
Br-1-2	45° 16' 15"	
	63° 14' 41"	
Br-2-1	45° 16' 08"	
	63° 14' 06"	
Br-3-1	45° 14' 50"	
	63° 15' 20"	
Br-4-1	45° 14' 15"	
	63° 13' 40"	
Br-5-1	45° 14' 00"	
	63° 15' 10"	
Br-6-1	45° 14' 10"	
	63° 12' 25"	
Br-7-1	45° 14' 10"	
	63° 11' 30"	
Br-7-2	45° 14' 10"	
	63° 11' 30"	
Br-7-3	45° 14' 10"	
	63° 11' 30"	
Br-8-1	45° 14' 00"	
	63° 11' 26"	
Br-9-1	45° 13' 56"	
	63° 11' 10"	
Br-10-1	45° 14' 05"	
	63° 10' 36"	
Br-11-1	45° 14' 06"	
	63° 09' 10"	
Br-12-1	45° 12' 30"	
	63° 15' 00"	
Br-13-1	45° 12' 26"	
	63° 15' 43"	
Br-14-1	45° 12' 31"	
	63° 14' 05"	
Br-15-1	45° 12' 48"	
	63° 15' 18"	
Br-16-1	45° 13' 25"	
Br-16-2	63° 15' 14"	
Br-17-1	45° 13' 17"	
	63° 15' 14"	
Br-18-1	45° 13' 12"	
	63° 15' 14"	

Br-19-1 45° 13' 08"
63° 15' 14"

Br-20-1 45° 12' 57"
63° 15' 14"

Br-21-1 45° 14' 46"
63° 17' 43"

Eastville (Hopewell, 11E/07 and Upper Musquodoboit, 11E/02) (Fig. 11)
Ea-1-1 45° 15' 06"
62° 54' 15"
Ea-2-1 45°14'50"
62°55'10"

Green Creek (Shubenacadie, 11E/03) (Fig. 12)
GC-1-1 45° 14' 12"
63° 25' 34"

GC-2-1 45° 14' 50"
63° 22' 31"

GC-3-1 45° 14' 19"
63° 24' 37"

Hilden (Truro, 11E/06) (Fig. 5)
Hi-1-1 45° 18' 03"
Hi-1-2 63° 20' 59"

Londonderry (Bass River, 11E/05) (Fig. 19)
Ld-1-1 45° 28' 33"
63° 40' 00"

Lower Five Islands (Lower Five Islands, 21H/08) (Fig. 21)
LFl-1-1 Not available

Manganese Mines (Truro, 11E/06) (Fig. 22)
MM-1-1 45° 24' 56"
63° 10' 10"

MM-2-1 45° 25' 00"
63° 09' 54"

MM-3-1 45° 25' 14"
63° 10' 00"

MM-4-1 45° 25' 23"
63° 10' 23"

MM-5-1 45° 24' 21"
63° 12' 12"

MM-6-1 45° 24' 33"
63° 11' 52"

Pembroke (Hopewell, 11E/07) (Fig. 11)
Pb-1-1 45° 17' 24"
62° 55' 00"

Pb-2-1 45° 15' 10"
62° 57' 06"

Pb-3-1 45° 15' 25"
62° 58' 00"

Pb-4-1 45° 15' 08"
62° 58' 51"

Pb-5-1 45° 15' 56"
62° 57' 06"

Pb-6-1 45° 17' 08"
62° 56' 09"

Penny Mountain (Truro, 11E/06) (Fig. 22)
PM-1-1 45° 24' 39"
63° 13' 40"

PM-2-1 45° 24' 29"
63° 14' 35"

Princeport (Truro, 11E/06) (Fig. 5)
Pt-1-1 45° 17' 35"
63° 28' 31"

Smithfield (Truro, 11E/06) (Fig. 35)
Sf-1-1 45° 16' 06"
63° 05' 09"

Stewiacke (Shubenacadie, 11E/03) (Figs. 38, 40)
Sw-1-1 45° 07' 37"
63° 16' 49"

Sw-2-1 45° 06' 44"
63° 21' 41"

Sw-3-1 45° 10' 41"
63° 22' 33"

Upper Economy (Bass River, 11E/05) (Fig. 41)
Ec-1-1 45° 24' 21"
63° 50' 20"

Wittenburg (Shubenacadie, 11E/03) (Fig. 38)
Wg-1-1 45° 07' 19"
63° 14' 54"

58 Samples - Colchester County

HALIFAX COUNTY

Dollar Lake (Musquodoboit, 11D/14) (Fig. 44)
DL-1-1 44° 56' 40"
63° 17' 12"

Elderbank (Musquodoboit, 11D/14)
(Figs. 45, 46)
Eb-1-1 45° 58' 45"
63° 12' 00"

Eb-2-1 44° 58' 40"
63° 11' 50"

Eb-3-1 44° 59' 00"
63° 11' 30"

Eb-4 44° 58' 30"
63° 12' 50"

Eb-5-1 44° 58' 10"
63° 13' 00"

Eb-6-1 44° 58' 00"
63° 13' 20"

Eb-7-1 44° 58° 20"
63° 12' 10"

Eb-8-1 44° 58' 30"
63° 11' 10"

Eb-9-1 44° 59' 05"
63° 11' 10"

Gays River (Shubenacadie, 11E/03) (Fig. 50)
GR-1-1 45° 01' 20"
63° 21' 44"

GR-2-1 45° 01' 30"
63° 21' 41"

GR-2-2 45° 01' 20"
63° 21' 50"

GR-3-1 45° 02' 21"
63° 18' 53"

GR-3-2 45° 02' 14"
GR-3-3 63° 18' 53"

GR-4-1 45° 02' 05"
63° 22' 05"

GR-5 45° 01' 40"
63° 20' 20"

GR-6-1 45° 02' 40"
63° 16' 50"

GR-7-1 45° 02' 45"
63° 16' 50"

GR-7-2 45° 02' 45"
63° 16' 45"

Lantz (Musquodoboit, 11D/14) (Fig. 53)
Lz-1-1 44° 59' 00"
63° 28' 30"

Meaghers Grant (Musquodoboit, 11D/14)
(Figs. 44, 46)
MG-1-1 44° 54' 49"
63° 13' 48"

MG-1-2 44° 54' 47"
63° 13' 13"

MG-2-1 44° 54' 39"
63° 13' 16"

MG-2-2 44° 54' 39"
63° 12' 57"

MG-2-3 44° 54' 38"
63° 13' 33"

MG-3-1 44° 54' 49"
63° 12' 37"

MG-4-1 44° 55' 40"
63° 12' 25"

MG-5-1 44° 55' 43"
63° 12' 44"

MG-6-1 44° 55' 35"
63° 16' 21"

MG-7-1 44° 55' 43"
63° 16' 13"

MG-8-1 44° 55' 05"
63° 14' 01"

Middle Musquodoboit (Shubenacadie, 11E/03 and Musquodoboit, 11D/14) (Figs. 45, 46, 56)

Mo-1-1 45° 03' 42"
63° 09' 00"

Mo-2-1 45° 00' 12"
63° 10' 34"

Mo-3 45° 01' 39"
63° 09' 31"

Mo-4-1 45° 01' 18"
63° 04' 08"

Mo-5-1 45° 01' 34"
63° 04' 19"

Mo-6-1 45° 01' 45"
63° 04' 53"

Mo-7-1 45° 03' 50"
63° 01' 51"

Mo-7-2 45° 03' 43"
63° 01' 38"

Mo-8-1 45° 03' 52"
63° 01' 45"

Mo-9-1 44° 59' 45"
63° 08' 00"

Mo-9-2 44° 59' 35"
63° 08' 15"

Mo-10-1 44° 59' 30"
63° 08' 20"

Mo-11-1 45° 01' 00"
63° 05' 40"

Mo-12-1 45° 00' 50"
63° 06' 00"

Mo-13 45° 06' 45"
63° 01' 15"

Mo-14-1 45° 00' 30"
63° 09' 00"

Mo-15-1 45° 01' 20"
63° 08' 30"

Mo-16-1 45° 01' 30"
63° 09' 30"

Mo-17-1 45° 02' 40"
63° 07' 50"

Mo-18-1 44° 59' 30"
63° 11' 07"

Mo-19-1 44° 59' 40"
63° 12' 30"

Mo-20-1 45° 03' 30"
63° 10' 00"

Mo-21-1 45° 01' 10"
63° 06' 10"

Upper Musquodoboit (Upper Musquodoboit, 11E/02) (Fig. 60)

UM-1-1 45° 05' 50"
62° 58' 00"

UM-2 45° 07' 00"
62° 57' 20"

UM-3-1 45° 07' 10"
62° 56' 40"

UM-4-1 45° 05' 40"
UM-4-2 62° 59' 00"

UM-5-1 45° 07' 30"
62° 56' 20"

UM-6-1 45° 05' 50"
63° 58' 40"

UM-6-2 45° 06' 00"
63° 58' 30"

64 Samples - Halifax County